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# UNIVERSITY OF MARYLAND

*Official Publication*

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March, 1939

No. 3

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## THE GRADUATE SCHOOL



*ANNOUNCEMENTS*

1939 - 1940

COLLEGE PARK, MARYLAND



THE UNIVERSITY  
*of*  
MARYLAND

THE GRADUATE SCHOOL  
ANNOUNCEMENTS

*FOR THE SESSIONS OF*

1939-1940



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# CALENDAR

1939 - 1940

1939

## FIRST SEMESTER

Sept. 15-16	Friday-Saturday	Complete registration.
Sept. 18	Monday, 8:20 a. m.	Instruction for first semester begins.
Oct. 4	Wednesday	Modern language examinations for Ph. D. requirement.
		Last day to file applications for admission to candidacy for Doctor's degree at Commencement of 1940.
Nov. 29	Wednesday, 5:10 p. m.	Thanksgiving recess begins.
Dec. 4	Monday, 8:20 a. m.	Thanksgiving recess ends.
Dec. 15	Friday, 5:10 p. m.	Christmas recess begins.
1940		
Jan. 2	Tuesday, 8:20 a. m.	Christmas recess ends.
Jan. 18-26	Thursday-Friday	First semester examinations.
Jan. 20	Saturday	Charter Day. Alumni and Faculty Banquet.

## SECOND SEMESTER

Jan. 24-31	Wednesday-Wednesday	Registration for second semester.
Feb. 1	Thursday, 8:20 a. m.	Instruction for second semester begins.
		Last day to file applications for admission to candidacy for the Master's degree at Commencement of 1940.
Feb. 7	Wednesday	Modern language examinations for Ph.D. requirement.
Feb. 22	Thursday	Washington's Birthday. Holiday.
March 21	Thursday, 5:10 p. m.	Easter recess begins.
March 26	Tuesday, 8:20 a. m.	Easter recess ends.
May 11	Saturday	Last day to deposit Doctor's thesis in office of Graduate School.
May 18	Saturday	Last day to deposit Master's thesis in office of Graduate School.
May 21-29	Tuesday-Wednesday	Second semester examinations.
May 26	Sunday, 11:00 a. m.	Baccalaureate sermon.
May 30	Thursday	Memorial Day. Holiday.
May 31	Friday	Class Day.
June 1	Saturday	Commencement.
June 5	Wednesday	Modern language examinations for Ph.D. requirement.

## SUMMER TERM

June 24	Monday	Summer session begins.
Aug. 2	Friday	Summer session ends.



## BOARD OF REGENTS

	TERM EXPIRES
W. W. SKINNER, Chairman Kensington, Montgomery County	1945
MRS. JOHN L. WHITEHURST, Secretary..... 4101 Greenway, Baltimore	1938
J. MILTON PATTERSON, Treasurer. .... 1015 Argonne Drive, Northwood, Baltimore	1944
W. CALVIN CHESNUT ..... Roland Park, Baltimore	1942
WILLIAM P. COLE, JR. .... Towson, Baltimore County	1940
HENRY HOLZAPFEL, JR. .... Hagerstown, Washington County	1943
HARRY H. NUTTLE..... Denton, Caroline County	1941
JOHN E. RAINE ..... Towson, Baltimore County	1939
JOHN E. SEMMES..... Baltimore Trust Building, Baltimore	1942

## ADMINISTRATIVE OFFICERS

H. C. BYRD, LL.D., President of the University.  
C. O. APPLEMAN, Ph.D., Dean of the Graduate School.  
ELSIE PARRETT, M. A., Secretary to the Dean.  
W. S. SMALL, Ph.D., Director of the Summer School.  
ADELE STAMP, M. A., Dean of Women.  
H. T. CASBARIAN, B. C. S., C. P. A., Comptroller.  
W. M. HILLEGEIST, Director of Admissions.  
ALMA H. PREINKERT, M. A., Registrar.  
CARL W. E. HINTZ, A. M. L. S., Librarian.  
H. L. CRISP, M. M. E., Superintendent of Buildings and Grounds.  
T. A. HUTTON, B. A., Purchasing Agent and Manager of Students' Supply Store

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## THE GRADUATE SCHOOL COUNCIL

H. C. BYRD, LL.D., President of the University.  
C. O. APPLEMAN, Ph.D., Dean of the Graduate School, Chairman.  
L. B. BROUGHTON, Ph.D., Professor of Chemistry.  
E. N. CORY, Ph.D., Professor of Entomology.  
H. F. COTTERMAN, Ph.D., Professor of Agricultural Education.  
C. B. HALE, Ph. D., Professor of English.  
L. V. HOWARD, Ph.D., Professor of Political Science.  
L. H. JAMES, Ph.D., Professor of Bacteriology.  
DEVOE MEADE, Ph.D., Professor of Animal and Dairy Husbandry.  
J. E. METZGER, M. A., Professor of Agronomy.  
M. MARIE MOUNT, M. A., Professor of Home and Institution Management.  
H. J. PATTERSON, D.Sc., Dean Emeritus of Agriculture.  
W. S. SMALL, Ph.D., Professor of Education.  
T. H. TALIAFERRO, C. E., Ph.D., Dean of the Faculty.  
A. E. ZUCKER, Ph.D., Professor of Modern Languages.  
WALTER H. HARTUNG, Ph.D., Professor of Pharmaceutical Chemistry  
(Baltimore).  
EDUARD UHLENHUTH, Ph.D., Professor of Gross Anatomy (Baltimore).

## GENERAL INFORMATION

### HISTORY AND ORGANIZATION

In the earlier years of the institution the Master's degree was frequently conferred, but the work of the graduate students was in charge of the departments concerned, under the supervision of the general faculty. The Graduate School of the University of Maryland was established in 1918, and organized graduate instruction leading to both the Master's and the Doctor's degree was undertaken. The faculty of the Graduate School includes all members of the various faculties who give instruction in approved graduate courses. The general administrative functions of the graduate faculty are delegated to a Graduate Council, of which the Dean of the Graduate School is chairman.

### LOCATION

The University of Maryland is located at College Park, in Prince George's County, Maryland, on the Baltimore and Ohio Railroad, eight miles from Washington and thirty-two miles from Baltimore. Washington, with its wealth of resources, is easily accessible by train, street car and bus.

The professional schools of Medicine, Nursing, Pharmacy, Dentistry and Law are located in Baltimore, at the corner of Lombard and Greene Streets.

### LIBRARIES

In addition to the resources of the University libraries the great libraries of the National Capital are easily available for reference work. Because of the proximity of these libraries to College Park they are a valuable asset to research and graduate work at the University of Maryland.

The library building at College Park contains a number of seminar rooms and other desirable facilities for graduate work.

### THE GRADUATE CLUB

The graduate students maintain an active Graduate Club. Several meetings for professional and social purposes are held during the year. Students working in different departments have an opportunity to become acquainted with one another and thus profit by the broad cultural values derived from contacts with fellow students working in different fields.

## GENERAL REGULATIONS

### ADMISSION

Graduates from recognized colleges regarded as standard by the institution and by regional or general accrediting agencies are admitted to the Graduate School. The applicant shall present an official transcript of his collegiate record which for unconditional admission shall show creditable completion of an undergraduate major in the subject chosen for specialization in the Graduate School.

Application blanks for admission to the Graduate School are obtained from the office of the Dean. After approval of the application, a matriculation card, signed by the Dean, is issued to the student. This card permits one to register in the Graduate School. After payment of the fee, the matriculation card is stamped and returned. It is the student's certificate of membership in the Graduate School, and may be called for at any succeeding registration.

Admission to the Graduate School does not necessarily imply admission to candidacy for an advanced degree.

## REGISTRATION

All students pursuing graduate work in the University, even though they are not candidates for higher degrees, are required to register in the Graduate School at the beginning of each semester. Students taking graduate work in the summer session are also required to register in the Graduate School at the beginning of each session. In no case will graduate credit be given unless the student matriculates and registers in the Graduate School. Registration for the first semester is held in the Gymnasium-Armory on the date designated in the calendar. Students register for the second semester and for the summer session in the office of the Dean, T-214, Agriculture Building. The program of work for the semester or the summer session is arranged by the student with the major department and entered upon two course cards, which are signed first by the professor in charge of the student's major subject and then by the Dean of the Graduate School. One card is retained by the Dean. The student takes the other card, and in case of a new student, also the matriculation card, to the Registrar's office, where the registration is completed. Students will not be admitted to graduate courses until the Registrar has certified to the instructor that registration has been completed. Course cards may be obtained at the Registrar's office or at the Dean's office. The heads of departments usually keep a supply of these cards in their respective offices.

## GRADUATE COURSES

Graduate students must elect for credit in partial fulfillment of the requirements for higher degrees only courses designated **For Graduates** or **For Graduates and Advanced Undergraduates**. Graduate students may elect courses numbered from 1 to 99 in the general catalogue but graduate credit will not be allowed for these. Students with inadequate preparation may be required to take some of these courses. No credit toward graduate degrees may be obtained by correspondence or extension study. Courses that are audited are registered for in the same way, and at the same fees, as other courses.

## PROGRAM OF WORK

The professor who is selected to direct a student's thesis work is the student's adviser in the formulation of a graduate program, including suitable minor work, which is arranged in cooperation with the instructors. To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions are limited to a program of thirty credit hours for the year, including thesis work, which is valued at not less than six hours.

### SUMMER GRADUATE WORK

Graduate work in the summer session may be counted as residence toward an advanced degree. By carrying approximately six semester hours of graduate work for four summer sessions at this institution, a student may fulfill the residence requirements for the master's degree, provided that the greater part of the thesis work can be done under direction during the periods between summer sessions. In some instances a fifth summer of residence may be required in order that a satisfactory thesis may be completed.

By special arrangement, graduate work may be pursued during the entire summer in some departments. Such students as graduate assistants, or others who may wish to supplement work done during the regular year, may satisfy one-third of an academic year's residence by full-time graduate work for eleven or twelve weeks, provided satisfactory supervision and facilities for summer work are available in their special fields.

The University publishes a special bulletin giving full information concerning the summer session and the graduate courses offered therein. The bulletin is available upon application to the Registrar of the University.

### GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

Graduate courses and opportunities for research are offered in some of the professional schools at Baltimore. Students pursuing graduate work in the professional schools must register in the Graduate School, and meet the same requirements and proceed in the same way, as do graduate students in other departments of the University.

The graduate courses in the professional schools are listed on pages 87-93.

### GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

Seniors who have completed all their undergraduate courses in this University by the end of the first semester, and who continue their residence in the University for the remainder of the year, are permitted to register in the Graduate School and secure the privileges of its membership, even though the bachelor's degree is not conferred until the close of the year.

A senior of this University who has nearly completed the requirements for the undergraduate degree may, with the approval of his undergraduate Dean and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which may later be transferred for graduate credit toward an advanced degree at this University, but the total of undergraduate and graduate courses must not exceed fifteen credits for the semester. Graduate credits earned during the senior year may not be used to shorten the residence period required for advanced degrees.

### ADMISSION TO CANDIDACY FOR ADVANCED DEGREES

Application for admission to candidacy for the Master's and for the Doctor's degree is made on application blanks which are obtained at the office of the Dean of the Graduate School. These are filled out in duplicate and after the required endorsements are obtained, the applications are acted upon by the Graduate Council. An official transcript of the candidate's undergraduate record and any



graduate courses completed at other institutions must be filed in the Dean's office before the application can be considered.

Admission to candidacy in no case assures the student of a degree, but merely signifies he has met all the formal requirements and is considered by his instructors sufficiently prepared and able to pursue such graduate study and research as are demanded by the requirements of the degree sought. The candidate must show superior scholarship by the type of graduate work already completed.

Application for admission to candidacy is made at the time stated in the sections dealing with the requirements for the degree sought.

### REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

**Advancement to Candidacy.** Each candidate for the Master's degree is required to make application for admission to candidacy not later than the date when instruction begins for the second semester of the academic year in which the degree is sought, but not until at least twelve semester course hours of graduate work have been completed. An average grade of "B" in all major and minor subjects is required.

**Minimum Residence.** A residence of at least one full academic year, or its equivalent, at this institution, is required.

**Course Requirements.** A minimum of twenty-four semester hours, exclusive of research, with an average "B" grade in courses approved for graduate credit, is required for the Master's degree. If the student is inadequately prepared for the required graduate courses, either in the major or minor subjects, additional courses may be required to supplement the undergraduate work. Of the twenty-four hours required in graduate courses, not less than twelve semester hours and not more than sixteen semester hours must be earned in the major subject. The remaining credits must be outside the major subject and must comprise a group of coherent courses intended to supplement and support the major work. Not less than one-half of the total required course credits for the Master's degree, or a minimum of twelve, must be selected from courses numbered 200 or above. The entire course of study must constitute a unified program approved by the student's major adviser and by the Dean of the Graduate School.

**Transfer of Credit.** Credit, not to exceed six hours, obtained at other recognized institutions may be transferred and applied to the course requirements of the Master's degree, provided that the work was of graduate character, and provided that it is approved for inclusion in the student's graduate program at the University of Maryland. This transfer of credit is approved by the Graduate Council when the student is admitted to candidacy for the degree. Acceptance of the transferred credit does not reduce the minimum residence period of one academic year. The candidate is subject to final examination by this institution in all work offered for the degree.

**Thesis.** In addition to the twenty-four semester hours in graduate courses a satisfactory thesis is required of all candidates for the Master's degree. It must demonstrate the student's ability to do independent work and it must be

acceptable in literary style and composition. It is assumed that the time devoted to thesis work will be not less than the equivalent of six semester hours earned in graduate courses. With the approval of the student's major professor and the Dean of the Graduate School, the thesis in certain cases may be prepared *in absentia* under direction and supervision of a member of the faculty of this institution.

The original copy of the thesis must be deposited in the office of the Graduate School not later than two weeks before commencement. An abstract of the contents of the thesis, 200 to 250 words in length, must accompany it. A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before the typing of the manuscript is begun. Individual copies of this manual may be obtained by the student at the Dean's office at nominal cost.

**Final Examination.** The final oral examination is conducted by a committee appointed by the Dean of the Graduate School. The student's adviser acts as the chairman of the committee. The other members of the committee are persons under whom the student has taken most of his major and minor courses. The chairman and the candidate are notified of the personnel of the examining committee at least one week prior to the period set for oral examinations. The chairman of the committee selects the exact time and place for the examination and notifies the other members of the committee and the candidate. The examination should be conducted within the dates specified and a report of the committee sent to the Dean as soon as possible after the examination. A special form for this purpose is supplied to the chairman of the committee. Such a report is the basis upon which recommendation is made to the faculty that the candidate be granted the degree sought. The period for the oral examination is usually one hour.

The examining committee also approves the thesis, and it is the candidate's obligation to see that each member of the committee has ample opportunity to examine a copy of the thesis prior to the date of the examination.

A student will not be admitted to final examination until all other requirements for the degree have been met.

## REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

**Advancement to Candidacy.** Candidates for the Doctor's degree must be admitted to candidacy not later than one academic year prior to the granting of the degree. Applications for admission to candidacy for the Doctor's degree are filled out by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School, not later than the first Wednesday in October of the academic year in which the degree is sought.

The applicant must have obtained from the head of the Modern Language Department a statement that he possesses a reading knowledge of French and German. Preliminary examinations or such other substantial tests as the departments may elect are also required for admission to candidacy.

**Residence.** Three years of full-time resident graduate study are required. The first two of the three years may be spent in other institutions offering standard graduate work. On a part-time basis the time needed will be correspondingly increased. All work at other institutions that is transferred in

partial fulfillment of the requirements for the Ph. D. degree is approved by the Graduate Council, upon recommendation of the department concerned, when the student is admitted to candidacy for the degree.

The Doctor's degree is not given merely as a certificate of residence and work, but is granted only upon sufficient evidence of high attainments in scholarship, and ability to carry on independent research in the special field in which the major work is done.

**Major and Minor Subjects.** The candidate must select a major and one or two closely related minor subjects. The minor work required varies from twenty-four to thirty hours at the discretion of the department concerned. The remainder of the required residence is devoted to intensive study and research in the major field. The amount of required course work in the major subject will vary with the department and the individual candidate. The candidate must register for a minimum of twelve semester hours of research.

**Thesis.** The ability to do independent research must be shown by a dissertation on some topic connected with the major subject. The original type-written copy and one clear carbon copy of the thesis, together with an abstract of the contents, 200 to 250 words in length, must be deposited in the office of the Dean at least three weeks before commencement. One or two extra copies of the thesis should be provided for use of members of the examining committee prior to the date of the final examination. The thesis is later printed in such form as the committee and the Dean may approve and fifty copies are deposited in the University library.

A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before typing of the thesis is begun. Students may obtain copies of this manual at the Dean's office, at nominal cost.

**Final Examination.** The final oral examination is held before a committee appointed by the Dean. One member of this committee is a representative of the graduate faculty who is not directly concerned with the student's graduate work. One or more members of the committee may be persons from other institutions who are distinguished scholars in the student's major field.

The duration of the examination is approximately three hours, and covers the research work of the candidate as embodied in his thesis, and his attainments in the fields of his major and minor subjects. The other detailed procedures are the same as those stated for the Master's examination.

## **RULES GOVERNING LANGUAGE EXAMINATIONS FOR CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

1. A candidate for the Doctor's degree must show in a written examination that he possesses a reading knowledge of French and German. The passages to be translated will be taken from books and articles in his specialized field. Some 300 pages of text from which the applicant wishes to have his examination chosen should be submitted to the head of the Department of Modern Languages at least three days before the examination. The examination aims to test ability to use the foreign language for research purposes. It is presumed that the candidate will know sufficient grammar to distinguish inflectional



forms and that he will be able to translate readily in two hours about 500 words of text with the aid of a dictionary.

2. Application for admission to these tests must be filed in the office of the Department of Modern Languages at least three days in advance of the tests.

3. No penalty is attached to failure in the examination, and the unsuccessful candidate is free to try again at the next date set for these tests.

4. Examinations are held near the office of the Department of Modern Languages, Arts and Sciences building, on the first Wednesdays in February, June, and October, at 2 p. m.

### GRADUATE FEES

The fees paid by graduate students are as follows:

A matriculation fee of \$10.00. This is paid once only, upon admission to the Graduate School.

A fixed charge, each semester, of \$6.00 per semester credit hour for students carrying eight hours or less; for students carrying more than eight hours, \$50.00 for the semester.

A diploma fee (Master's degree), \$10.00.

A graduation fee, including hood (Doctor's degree), \$20.00.

Laboratory fees range from \$2.00 to \$8.00 per semester hour.

### FELLOWSHIPS AND ASSISTANTSHIPS

**Fellowships.** A number of fellowships have been established by the University. A few industrial fellowships are also available in certain departments. The stipend for the University fellows is \$400 for the academic year and the remission of all graduate fees except the diploma fee.

Application blanks for University fellowships may be obtained from the office of the Graduate School. The application, with the necessary credentials, is sent by the applicant directly to the Dean of the Graduate School.

Fellows are required to render minor services prescribed by their major departments. The usual amount of service required does not exceed twelve clock hours per week. Fellows are permitted to carry a full graduate program, and they may satisfy the residence requirement for higher degrees in the normal time.

The selection of fellows is made by the departments to which the fellowships are assigned, with the approval of the dean or director concerned, but all applications must first be approved by the Dean of the Graduate School. The awards of University fellowships are on a competitive basis.

**Graduate Assistantships.** A number of teaching and research graduate assistantships are available in several departments. The compensation for these assistantships is \$800 a year and the remission of all graduate fees except the diploma fee. Graduate assistants are appointed for one year and are eligible to reappointment. The assistant in this class devotes one half of his time to instruction or to research in connection with Experiment Station projects, and he is required to spend two years in residence for the Master's degree. If he continues in residence for the Doctor's degree, he is allowed two-thirds residence credit for each academic year at this University. The minimum residence re-

quirement from the Bachelor's degree, therefore, may be satisfied in four academic years and one summer, or three academic years and three summer sessions of eleven or twelve weeks each.

**Other Assistants.** Assistants not in the regular \$800 class are frequently allowed to take graduate courses if they are eligible for admission to the Graduate School. The stipend for these assistants varies with the services rendered, and it may or may not include the remission of graduate fees. The question of fees is decided in each individual case by the dean or director concerned when the stipend is arranged. The amount of graduate work these assistants are permitted to carry is determined by the head of the department, with the approval of the dean or director concerned. The Graduate Council, guided by the recommendation of the student's advisory committee, prescribes the required residence in each individual case at the time the student is admitted to candidacy.

Further information regarding assistantships may be obtained from the department or college concerned.

### COMMENCEMENT

Attendance is required at the commencement at which the degree is conferred, unless the candidate is excused by the Dean of the Faculty.

Application for diploma must be filed in the office of the Registrar before March 1 of the year in which the candidate expects to obtain a degree.

Academic costume is required of all candidates at commencement. Candidates who so desire may purchase or rent caps and gowns at the Students' Supply Store. Order must be filed before March 20, but may be cancelled later if the student finds himself unable to complete his work for the degree.

## DESCRIPTION OF COURSES

For the convenience of students in making out schedules of studies, the subjects in the following Description of Courses are arranged alphabetically:

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For convenience in identification, Courses for Graduates and Advanced Undergraduates are numbered 100 to 199; Courses for Graduates are numbered 200 and upward.

The letter following the number of the course indicates the semester in which the course is offered: Thus, 100f is offered the first semester; 101s, the second semester; 102y, the year.

The number of semester hours' credit is shown by the arabic numeral in parentheses after the title of the course. In courses which continue through the year, the number shown is the total for both semesters.

A separate schedule of courses is issued each semester, giving the hours, places of meeting, and other information required by the student in making out his schedule. Students will obtain these schedules when they register.

## AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**A. E. 100 f. Farm Economics (3)**—Three lectures, Prerequisites, Econ. 51f and 52 s, or 57 f or s.

A general course in agricultural economics, with special reference to population trend, cultural wealth, land tenure, farm labor, agricultural credit, the tariff, price movements, and marketing. DeVault.

**A. E. 102 s. Marketing of Farm Products (3)**—Three lectures. Prerequisites, Econ. 51 f and 52 s, or 57 f or s.

A complete analysis of the present system of transporting, storing, and distributing farm products, and a basis for intelligent direction of effort in increasing the efficiency of marketing methods. DeVault.

**A. E. 103 f. Co-operation in Agriculture (3)**—Three lectures.

Historical and comparative development of farmers' co-operative organizations with some reference to farmer movements; reasons for failure, and essentials to success; commodity developments; the Federal Farm Board; banks for co-operatives; present trends. Ives.

**A. E. 104 s. Farm Finance (3)**—Three lectures.

Agricultural credit requirements; development and volume of business of institutions financing agriculture; financing specific farm organizations and industries. Farm insurance—fire, crop, livestock, and life insurance, with especial reference to mutual developments—how provided, benefits, and needed extension. Coddington.

**A. E. 105 s. Food Products Inspection (2)**—One lecture; one laboratory.

This course, arranged by the Department of Agricultural Economics in co-operation with the State Department of Markets and the United States Department of Agriculture, is designed to give the students primary instruction in the grading, standardizing and inspection of fruits and vegetables, dairy products, poultry products, meats, and other food products. Theoretical instruction covering the fundamental principles will be given in the form of lectures, while the demonstrational and practical work will be conducted through laboratories and field trips to Washington, D. C., and Baltimore. Staff.

**A. E. 106 s. Prices of Farm Products (3)**—Two lectures; one laboratory.

A general course in prices, price relationships, and price analysis, with emphasis on prices of agricultural products. Ives.

**A. E. 107 s. Analysis of the Farm Business (3)**—One lecture; two laboratories.

A concise, practical course in the keeping, summarizing, and analyzing of farm accounts. Hamilton.

**A. E. 108 f. Farm Management (3)**—Three lectures.

A study of the organization and operation of Maryland farms from the standpoint of efficiency and profits. Students will be expected to make an analysis of the actual farm business and practices of different types of farms located in various parts of the state, and to make specific recommendations as to how these farms may be organized and operated as successful businesses. Hamilton.

**A. E. 109 y. Research Problems (1-3).**

With the permission of the instructor, students will work on any research problems in agricultural economics which they may choose, or a special list of subjects will be made up from which the students may select their research problems. There will be occasional class meetings for the purpose of making reports on progress of work, methods of approach, etc. DeVault.

**A. E. 111 f. Land Economics (3)—Three lectures.**

Concepts of land economy are discussed, as well as conditions and tendencies influencing land requirements in relation to land resources. A study of major land problems and land policies including erosion and its control; farm tenancy; tax delinquency and tax reverted lands; land use planning and production control; public policies for facilitating land use adjustments; and directional measures for discouraging undesirable land uses. Coddington.

COURSES FOR GRADUATES

**A. E. 201 y. Special Problems in Farm Economics (3).**

An advanced course dealing more extensively with some of the economic problems affecting the farmer, such as land problems, agricultural finance, farm wealth, agricultural prices, transportation, and special problems in marketing and co-operation. DeVault.

**A. E. 202 y. Seminar (1-2).**

This course will consist of special reports by students on current economic subjects, and a discussion and criticism of the same by the members of the class and the instructor. DeVault.

**A. E. 203. Research (8)**—Students will be assigned research work in agricultural economics under the supervision of the instructor. The work will consist of original investigation in problems of agricultural economics, and the results will be presented in the form of a thesis. DeVault.

**A. E. 210 s. Taxation in Relation to Agriculture (2)—Two lectures.**

Principles and practices of taxation in their relation to agriculture, with special reference to the trends of tax levies, taxation in relation to land utilization, taxation in relation to ability to pay and benefits received; a comparison of the following taxes as they affect agriculture—general property tax, income tax, sales tax, gasoline and motor vehicle license taxes, inheritance tax, and special commodity taxes; possibilities of farm tax reduction through greater efficiency and economies in local government. DeVault and Walker.

**A. E. 211 f. Taxation in Theory and Practice (3)**—Two lectures; one laboratory.

Ideals in taxation; economic effects of taxation upon the welfare of society; theory of taxation; the general property tax, business and license taxes, the income tax, the sales tax, special commodity taxes, inheritance and estate taxes; recent shifts in taxing methods and recent tax reforms; conflicts and duplication in taxation among governmental units; practical and current problems in taxation. DeVault and Walker.

**A. E. 212 f, 213 s. Land Utilization and Agricultural Production (3, 2)**—Two double lecture periods a week.



A presentation, by regions, of the basic physical conditions of the economic and social forces that have influenced agricultural settlement, and of the resultant utilization of the land and production of farm products; followed by a consideration of the regional trends and interregional shifts in land utilization and agricultural production, and the outlook for further changes in each region.

Baker.

**A. E. 214 s. Consumption of Farm Products and Standards of Living (3)**—Two double lecture periods a week.

A presentation of the trends in population and migration for the nation and by states, of the trends in exports of farm products and their regional significance, of the trends in diet and in per capita consumption of non-food products; followed by a consideration of the factors that appear likely to influence these trends in the future, and of the outlook for commercial as contrasted with a more self-sufficing agriculture.

Baker.

**A. E. 215 s. Advanced Agricultural Co-operation (2)**—Two lectures.

An appraisal of agricultural co-operation as a means of improving the financial status of farmers. More specifically, the course includes a critical analysis and appraisal of specific types and classes of co-operatives.

Ives.

## AGRICULTURAL EDUCATION AND RURAL LIFE

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**R. Ed. 107 f. Observation and Analysis of Teaching for Agricultural Students. (3)**—Two lectures; one laboratory. Prerequisite, Ed. Psych. 1 f.

This course deals with analysis of pupil learning in class groups.

Cotterman.

**R. Ed. 109 f. Teaching Secondary Vocational Agriculture (3)**—Three lectures. Prerequisites, R. Ed. 105 f, 107 f; A. H. 1, 2; D. H. 1; Poultry 1; Soils 1; Agron. 1, 2; Hort. 1, 11; F. Mech. 101, 104; A. E. 2, 102; F. M. 2.

A comprehensive course in the work of high school departments of vocational agriculture. It emphasizes particularly placement, supervised farming programs, the organization and administration of Future Farmer work, and objectives and methods in all-day, continuation, and adult instruction.

Cotterman.

**R. Ed. 110 s. Rural Life and Education (3)**—Three lectures.

An intensive study of the educational agencies at work in rural communities, stressing particularly analysis of school patronage areas, the possibilities of normal life in rural areas, early beginnings in rural education, and the conditioning effects of economic differences. The course is designed especially for persons who expect to be called upon to assist in shaping educational and other community programs for rural people.

Cotterman.

**R. Ed. 112 s. Departmental Organization and Administration (1)**—One lecture. Prerequisite, R. Ed. 105 f, 107 f, 109 f.

The work of this course is based upon the construction and analysis of administrative programs for high school departments of vocational agriculture. As a project, each student prepares and analyzes in detail an administrative program for a specific school. Investigations and reports.

Cotterman.

**R. Ed. 114 s. Teaching Farm Shop in Secondary Schools (1)**—One lecture. Objectives in the teaching of farm shop; contemporary developments; determination of projects; shop management; shop programs; methods of teaching; equipment; materials of instruction; special projects. Carpenter.

**R. Ed. 120 f or s. Practice Teaching (2)**—Prerequisites, R. Ed. 105 f, 107 f, 109 f.

Under the immediate direction of a critic teacher the student in this course is required to analyze and prepare special units of subject-matter, plan lessons, and teach in co-operation with the critic teacher, exclusive of observation, not less than twenty periods of vocational agriculture. Cotterman.

### COURSES FOR GRADUATES

**R. Ed. 201 f, 202 s. Rural Life and Education (3, 3)**—Prerequisite, R. Ed. 104 s, or equivalent.

A sociological approach to rural education as a movement for a good life in rural communities. It embraces a study of the organization, administration and supervision of the several agencies of public education as component parts of this movement and as forms of social economy and human development. Discussions, assigned readings and major term papers in the field of the student's special interest. Cotterman.

**R. Ed. 207 f, 208 s. Problems in Vocational Agriculture, Related Science, and Shop (1-2, each semester).**

In this course special emphasis is placed upon the current problems facing teachers of vocational agriculture. It is designed especially for persons who have had several years of teaching experience in this field. The three phases of the vocational teacher's program—all day, part-time, and adult work—receive attention. Discussions, surveys, investigations and reports. Cotterman.

**R. Ed. 250 y. Seminar in Rural Education (2-4).**

Problems in the organization, administration and supervision of the several agencies of rural education. Investigation, papers and reports. Cotterman.

**R. Ed. 251. Research (2-4)**—Credit hours according to work done. Students must be specially qualified by previous work to pursue with profit the research to be undertaken. Cotterman.

### AGRONOMY

#### Division of Crops

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Agron. 103 f. Crop Breeding (2)**—One lecture; one laboratory. Prerequisite, Gen. 101.

The principles of breeding as applied to field crops and methods used in crop improvement. Kemp.

**Agron. 121 s. Methods of Crop and Soil Investigation (2)**—One lecture; one laboratory.

A consideration of crop and soil investigation methods at the various experiment stations, and the standardization of such methods. Metzger.

## COURSES FOR GRADUATES

**Agron. 201 y. Crop Breeding (4-10)**—Credits determined by work accomplished.

The content of this course is similar to that of Agron. 103 f, but will be adapted more to graduate students, and more of a range will be allowed in choice of materials to suit special cases. Kemp.

**Agron. 203 y. Seminar (2)**—One report period each week.

The seminar is devoted largely to reports by students on current scientific publications dealing with problems in crops and soils.

**Agron. 209. Research (4-8)**—Credits determined by work accomplished.

With the approval of the head of the department the student will be allowed to work on any problem in agronomy, or he will be given a list of suggested problems from which he may make a selection. Staff.

## Division of Soils

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Soils 103 f. Soil Geography (3)**—Two lectures; one discussion period.

A study of the genealogy of soils, the principal soil regions of North America, and the classification of soils. Field trips will be made to emphasize certain important phases of the subject.

**Soils 112 s. Soil Conservation (3)**—Three lectures.

A study of the factors relating to soil preservation, including the influence of cropping and soil management practices, fertilizer treatments, constructive and destructive agencies of man and nature on conservation, history of research work in soil erosion, and field trips to soil demonstration areas. Thomas.

## COURSES FOR GRADUATES

**Soils 201. Special Problems and Research (10-12).**

Original investigation of problems in soils and fertilizers.

Staff.

**Soils 202 y. Soil Technology (5 f, 2 s)**—Two lectures, two laboratories, first semester. Two lectures, one laboratory, second semester. Prerequisites, Geology 1, Soils 1, and Chemistry 1.

In the first semester, chemical and physico-chemical study of soil problems as encountered in field, greenhouse, and laboratory. In the second semester, physical and plant nutritional problems related to the soil. Thomas.

**Soils 204 s. Soil Microbiology (3)**—Two lectures; one laboratory. Prerequisite, Bact. 1.

A study of the microorganisms of the soil in relation to fertility. It includes the study of the bacteria of the soil concerned in the decomposition of organic matter, nitrogen fixation, nitrification, and sulphur oxidation and reduction, and deals also with such organisms as fungi, algae, and protozoa. The course includes a critical study of the methods used by experiment stations in soil investigational work. Bodily.



## ANIMAL HUSBANDRY

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**A. H. 111 f. Livestock Markets and Marketing (2)**—Two lectures. Prerequisite, A. H. 2 s. (Not given in 1939-1940.)

A comprehensive study of the marketing of sheep, beef cattle, hogs and draft horses, and practices found in the vast American livestock market system, together with the facilities available for the marketing and merchandising of all kinds of livestock and meat products. Leinbach, Ikeler.

**A. H. 112 s. Geography of Livestock Production (2)**—Two lectures.

A course designed to familiarize students with livestock management, production and marketing practices in other parts of the world. Consideration is given to the bearing of foreign livestock and meat industries on this country's production, including an insight into our foreign markets. Leinbach, Ikeler.

**A. H. 113 f. Animal Nutrition (3)**—Three lectures. Prerequisites, Chem. 12A y and A. H. 102 f.

Processes of digestion, absorption, and metabolism of nutrients, nutritional balances, nature of nutritional requirements for growth, production and reproduction. Meade.

**A. H. 114 s. Advanced Breeding (2)**—Two lectures. Prerequisites, Gen. 101 f and A. H. 103 s.

This course deals with the more technical phases of heredity, variation, recombination, and mutation; selection and selection indexes; breeding systems; specific inheritance in farm animals and with biometry as applied to animal breeding. Meade.

## COURSES FOR GRADUATES

**A. H. 201 f or s. Special Problems in Animal Husbandry (2-3)**—Credit given in proportion to amount of work completed.

► Problems which relate specifically to the character of work the student is pursuing will be assigned. Staff.

**A. H. 202 s. Seminar (1).**

Students are required to prepare papers based upon current scientific publications relating to animal husbandry or upon their research work, for presentation before and discussion by the class. Staff.

**A. H. 203. Research**—Credit to be determined by the amount and character of work done.

With the approval of the head of the department, students will be required to pursue original research in some phase of animal husbandry, carry the same to completion, and report the results in the form of a thesis. Meade, Leinbach.

## BACTERIOLOGY

## A. Bacteriology

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES\*

**Bact. 101 f. Milk Bacteriology (4)**—Two lectures; two laboratories. Prerequisite, Bact. 1. Registration limited.

Bacteria in milk, sources and development; milk fermentation; sanitary production; care and sterilization of equipment; care and preservation of milk and cream; pasteurization; public health requirements. Standard methods of milk analysis; practice in the bacteriological control of milk supplies and plant sanitation; occasional inspection trips. Black.

**Bact. 102 s. Dairy Products Bacteriology (3)**—One lecture; two laboratories. Prerequisite, Bact. 1; Bact. 101 f desirable.

Relation of bacteria, yeasts and molds to cream, concentrated milks, starters, fermented milks, ice cream, butter, cheese, and other dairy products; sources of contamination. Microbiological analysis and control; occasional inspection trips. Black.

**Bact. 111 f. Food Bacteriology (3)**—One lecture; two laboratories. Prerequisite, Bact. 1.

Bacteria, yeasts and molds in foods; relation to preservation and spoilage; food infections and food poisoning. James.

**Bact. 111 s. Bacteriology of Food Production (3)**—One lecture; two laboratories.

Bacteriology of food production and food fermentations; industrial hygiene and occupational diseases. James.

**Bact. 112 s. Sanitary Bacteriology (3)**—One lecture; two laboratories. Prerequisite, Bact. 1. Registration limited.

Bacteriological and public health aspects of water supplies and water purification; swimming pool sanitation; sewage disposal; industrial wastes; disposal of garbage and refuse; municipal sanitation. Practice in standard methods for examination of water, sewage and other sanitary analyses; differentiation and significance of the coli-aerogenes group.

**Bact. 115 f. Serology (4)**—Two lectures; two laboratories. Prerequisite, Bact. 2 s. Registration limited.

Infection and resistance; agglutination, precipitation, lytic and complement fixation reactions; principles of immunity and hypersensitiveness. Preparation of necessary reagents; general immunologic technique; factors affecting reactions; applications in identification of bacteria and diagnosis of disease.

Faber.

**Bact. 116 s. Epidemiology (2)**—Two lectures. Prerequisite, Bact. 1 and credit in, or registration in Bact. 2 or 2 A. Alternates with Bact. 126 s.

\* One or more of the scheduled courses may also be given during the evening if a sufficient number of students register. A special fee is charged.

Epidemiology of important infectious diseases, including history, characteristic features, methods of transmission, immunization and control; periodicity; principles of investigation; public health applications. Faber.

**Bact. 118 f. Systematic Bacteriology (2)**—Two lectures. Prerequisite, 10 hours of bacteriology.

History of bacterial classification; genetic relationships, international codes of nomenclature; bacterial variation as it affects classification. James.

**Bact. 113 f and s. Advanced Methods (2)**—One lecture; one laboratory. Prerequisite, 10 hours of bacteriology. Registration limited.

Microscopy, dark field and single cell technique, photomicrography; colorimetric and potentiometric determinations; oxidation-reduction; electrophoresis; surface tension; gas analysis; special culture methods; filtration; animal care; practice in media and reagent preparation. Bodily.

**Bact. 123 f, 124 s. Bacteriological Problems (2, 2)**—Laboratory. Prerequisites, Bact. 1 and 2 and any other courses needed for the project. Registration limited.

Subject matter suitable to the needs of the particular student, or problems as an introduction to research, will be arranged. Staff.

**Bact. 125 f. Clinical Methods (3)**—One lecture; two laboratories. Prerequisite, Bact. 2 or consent of instructor.

Methods for microscopic examination of blood; bacteriological examination of sputum, feces and spinal fluids, microscopic and routine chemical methods for examination of urine. Faber.

**Bact. 117 s. Public Health (1)**—One lecture. Prerequisites, Bact. 1 and 2. Alternates with Bact. 116 s.

A series of weekly lectures on public health and its administration.

James, in charge.

**Bact. 131 f, 132 s. Journal Club (1, 1)**—Prerequisites, Bact. 1 and 2.

Students will submit reports on current scientific literature or on individual problems in bacteriology, which will be discussed and criticized by members of the class and staff. Black.

#### COURSES FOR GRADUATES

**Bact. 205 f. Research Methods (1)**—One lecture. Prerequisite, 6 hours of bacteriology.

Methods of research; library practice; current literature; preparation of papers; research institutions, investigators; laboratory design, equipment and supplies; academic practices; professional aids. Black.

**Bact. 206 s. Physiology of Bacteria (2)**—Two lectures. Prerequisites, 10 hours of bacteriology, and Chem. 108 s or equivalent.

Growth; chemical composition; physical characteristics; energy relationships; influence of environmental conditions on growth and metabolism; disinfection; physiological interrelationships; changes occurring in media. James.

**Bact. 207 f, 208 s. Special Topics (1, 1).** Prerequisite, 10 hours of bacteriology.

Presentation and discussion of fundamental problems and special subjects.  
Black.

**Bact. 211 f. Bacterial Metabolism (2)**—Two lectures. Prerequisites, Bact. 1, Chem. 12 y or equivalent.

Growth, chemical composition, oxygen relations; enzymes; bacterial metabolism and respiration; chemical activities of microorganisms; industrial fermentations.  
Black.

**Bact. 221. Research (1-6).** Prerequisites, Bact. 1 and 2, and any other courses needed for the particular project. Credit will be determined by the amount and character of the work accomplished.

Properly qualified students will be admitted upon approval of the department head. The investigation is outlined in consultation with and pursued under supervision of a faculty member of the department.  
Staff.

**Bact. 231 f, 232 s. Seminar (2,2).** Prerequisite, 10 hours of bacteriology. Discussions and reports prepared by the student on current research, selected subjects, and recent advances in bacteriology.  
James.

## B. Food Technology

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**F. Tech. 100 f. Food Microscopy (2)**—Two laboratories.

Microscopical analysis of foods following the methods used in the Federal Government and other agencies. Studies of the structural composition of agricultural and manufactured foods. Use of microscopic tests in factory control and analyses.

**F. Tech. 101 f. Regulatory Control (2)**—Two lectures, including demonstrations.

Methods followed in the control of foods in interstate and intrastate commerce. Consideration of laboratory basis of standards of control.

**F. Tech. 102 y. Technology Conference (2)**—One lecture.

Reports and discussions of current developments in the field of food technology.

**F. Tech. 103 y. Food Sanitation (2)**—One lecture; one field trip. Prerequisites, Bact. 1, Bact. 110 f, and Bact. 111 s, or their equivalent.

Principles of sanitation in food manufacture and distribution; methods of control of sanitation in commercial canning, pickling, bottling, preserving, refrigeration, dehydration, etc.

## BOTANY

### A. General Botany and Morphology

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Bot. 101 f. Plant Anatomy (3)**—One lecture; two laboratories. Prerequisite, Bot. 1 f.

The origin and development of the organs and tissue systems in the vascular plants, with special emphasis on the structures of roots, stems and leaves. Reports on current literature are required. Bamford.

**Bot. 103 f. Plant Taxonomy (3)**—One lecture; two laboratories. (Not given in 1939-1940.)

Classification of the vegetable kingdom, and the principles underlying it; the use of other sciences and all phases of botany as taxonomic foundations; methods of taxonomic research in field, garden, herbarium and library. Each student to work on a special problem during some of the laboratory time.

Norton.

**Bot. 104 s. Advanced Plant Taxonomy (3)**—One lecture; two laboratories.

Principles and criteria of plant taxonomy. Reviews and criticisms of current taxonomic literature. Each student works on an original problem during the laboratory time.

Norton.

**Bot. 105 s. Economic Plants (2)**—Two lectures. (Not given in 1939-1940.)

The names, taxonomic position, native and commercial geographic distribution, and use of the leading economic plants of the world are studied. A collection of plant products from markets, stores, factories, etc., is made by students to illustrate the useful plants both in the natural form and as used by man.

Norton.

**Bot. 106 f. History and Philosophy of Botany (1)**—One lecture.

Discussion of the development of ideas and knowledge about plants, also a survey of contemporary work in botanical science.

Norton.

**Bot. 107 s. Methods in Plant Histology (2)**—Two laboratories.

Principles and methods involved in the preparation of permanent slides.

Brown.

#### COURSES FOR GRADUATES

**Bot. 201 s. Cytology (4)**—Two lectures; two laboratories. Prerequisite, Bot. 1 f.

A detailed study of the cell during its metabolic and reproductive stages. The major portion is devoted to chromosomes in mitosis and meiosis, and the relation of these stages to current theories of heredity and evolution. The laboratory involves the preparation, examination and illustration of cytological material by current methods.

Bamford.

**Bot. 202 s. Plant Morphology (2)**—Two laboratories.

A comparative study of the morphology of the flowering plants with special reference to their phylogeny and development.

Bamford.

**Bot. 203 f and s. Seminar (1).**

The study of special topics in plant morphology, anatomy and cytology.

Bamford.

**Bot. 204. Research.** Credit according to work done. Norton, Bamford.



**B. Plant Pathology and Mycology****COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**Plt. Path. 101 f. Diseases of Fruits (2-4)**—Two lectures; laboratory according to credit desired. Prerequisite, Plt. Path. 1 f.

An intensive study intended to give a rather thorough knowledge of the subject matter, such as is needed by those who expect to become advisers in fruit production, as well as those who expect to become specialists in plant pathology. Temple.

**Plt. Path. 102 s. Diseases of Garden and Field Crops (2-4)**—Two lectures; laboratory according to credit desired. Prerequisite, Plt. Path. 1 f.

The diseases of garden crops, truck crops, cereal and forage crops. Intended for students of vegetable culture, agronomy, and plant pathology, and for those preparing for county agent work. Temple.

**Plt. Path. 103 s. Research Methods (2)**—One conference and five hours of laboratory. Prerequisite, Plt. Path. 1 f or equivalent.

Technique of plant disease investigation: sterilization, cultural methods, isolation of pathogens, inoculation methods and photography. Woods.

**Plt. Path. 104 f and s. Minor Investigations (1-3)**—Credit according to work done. A laboratory course with individual conferences. Prerequisite, Plt. Path. 1 f.

In this course, only minor problems or special phases of major investigations may be undertaken. Their solution may include a survey of the literature on the problem under investigation and both laboratory and field work.

Norton, Temple, Woods.

**Plt. Path. 105 s. Diseases of Ornamentals (2)**—Two lectures.

The most important diseases of plants grown in greenhouse, flower garden, and landscape, including shrubs and shade trees. Temple.

**Plt. Path. 106 y. Seminar (2).**

Conferences and reports on plant pathological literature and on recent investigations. Temple, Norton, Woods.

**Plt. Path. 107 f. Plant Disease Control (3)**—Two lectures; one laboratory. Prerequisite, Plt Path, 1 f.

An advanced course dealing with the theory and practice of plant disease control; the preparation of sprays and other fungicides and the testing of their toxicity in greenhouse and laboratory; demonstration and other extension methods adapted to county agent work and to the teaching of agriculture in high schools. Temple.

**Plt. Path. 108 f. Mycology (4)**—Two lectures; two laboratories.

An introductory study of the morphology, life histories, classification, and economics of the fungi. Norton, Woods.

## COURSES FOR GRADUATES

**Plt. Path. 201 s. Virus Diseases (2)**—Two lectures.

An advanced course, including a study of the current literature on the subject and the working of a problem in the greenhouse. Woods.

**Plt. Path. 203 f. Non-Parasitic Diseases (3)**—Two lectures; one laboratory.

Effects of maladjustment of plants to their environment; injuries due to climate, soil, gases, dust, sprays, fertilizers, improper treatment, and other detrimental conditions. Norton.

**Plt. Path. 205. Research**—Credit according to work done.

Norton, Temple, Woods.

## C. Plant Physiology

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Plt. Phys. 101 f. Plant Physiology (4)**—Two lectures; two laboratories. Prerequisite, Bot. 1 f.

A summary view of the general physiological activities of plants. The aim in this course is to stress principles rather than factual details. Brown.

**Plt. Phys. 102 s. Plant Ecology (3)**—Two lectures; one laboratory. Prerequisite, Bot. 1 f.

The study of plants in relation to their environments. Plant formations and successions in various parts of the country are briefly treated. Much of the work, especially the practical, must be carried on in the field, and for this purpose type regions adjacent to the University are selected. Brown.

## COURSES FOR GRADUATES

**Plt. Phys. 201 s. Plant Biochemistry (4)**—Two lectures; two laboratories. Prerequisite, an elementary knowledge of plant physiology and organic chemistry.

An advanced course in plant physiology in which the chemical aspects are specially emphasized. It deals with the important substances in the composition of the plant body and with the important processes in plant life.

Appleman, Shirk.

**Plt. Phys. 202A f. Plant Biophysics (2)**—Two lectures. Prerequisites, Bot. 1f, and Plt. Phys. 101f, or equivalent. Students electing this course should elect Plt. Phys. 202 Bf.

An advanced course dealing with the operation of physical forces in plant life processes. Appleman, Brown.

**Plt. Phys. 202B f. Biophysical Methods (2).**

Shirk.

**Plt. Phys. 203 s. Plant Microchemistry (2)**—One lecture; one laboratory. Prerequisite, Bot. 1 f, Chem. 1 y, or equivalents.

The isolation, identification, and localization of organic and inorganic substances found in plant tissues by micro-technical methods. The use of these methods in the study of metabolism in plants is emphasized. Brown.

**Plt. Phys. 204 f. Growth and Development (2).** (Not given in 1939-1940.)

Appleman, Brown.

**Plt. Phys. 205 f and s. Seminar (1).**

Students are required to prepare reports of papers in the current literature. These are discussed in connection with the recent advances in the subject.

Appleman.

**Plt. Phys. 206. Research—Credit according to work done.**

Students must be specially qualified by previous work to pursue with profit the research to be undertaken.

Staff.

## BUSINESS ADMINISTRATION

Some of the specialized courses in the following lists may be offered only in alternate years, whenever prospective enrollments therein do not justify repeating annually. Such courses are indicated by an asterisk.

See also related courses in Economics and in Agricultural Economics.

### A. Accounting

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Acct. 101 f. Advanced Accounting I (3)**—Three lectures. Prerequisite, Acct. 51 y.

Advanced theory and problems in connection with the following: working papers, statements; corporations; actuarial science; cash; accounts receivable; notes and acceptances; inventories, consignments; installment sales.

**Acct. 102 s. Advanced Accounting II (3)**—Three lectures. Prerequisite, Acct. 101 f.

Advanced theory and problems in connection with the following: tangible fixed assets; intangible assets; investments; liabilities; funds and reserves; correction of statements and books; comparative statements; the analysis of working capital; miscellaneous ratios; profit and loss analysis; and statement of application of funds.

**Acct. 121 f. Cost Accounting (2)**—Two lectures. Prerequisite, Acct. 51 y.

The need and value of cost accounting; cost systems and cost classifications; classification of accounts; subsidiary ledgers and cost records; outline of specific order cost accounting; accounting for material; material storage and consumption; valuation of materials; special features of accounting for labor cost; accounting for manufacturing expense; distribution of service department costs; distribution of manufacturing expense to production; control of distribution costs; monthly closing entries. Theory, problems, and practice set. Cissel.

**Acct. 122 s. Advanced Cost Accounting (2)**—Two lectures. Prerequisite, Acct. 121 f.



Preparation of analytical statements; comparative statements; process cost accounting; standard costs; analysis of variances; accounting for standard costs; estimating cost systems; special considerations; arguments for and against including interest on investments; graphic charts; uniform methods. A discussion of advanced theory and problems. Cissel.

**Acct. 161 f. Income Tax Procedure (3)**—Three lectures. Prerequisite, Acct. 102 s.

Income tax in theory and practice. Selected cases and problems illustrating the definition of taxable income of individuals, corporations, and estates. Wedeberg.

**Acct. 171 f. Auditing Theory (2)**—Two lectures. Prerequisite, Acct. 102 s. Principles of auditing, including a study of different kinds of audits, the preparation of reports, and illustrative cases or problems. Cissel.

**Acct. 172 s. Practical Auditing (2)**—Two lectures. Prerequisite, Acct. 171 f. A practical application of auditing theory. Cissel.

**Acct. 181 f. Specialized Accounting (3)**—Three lectures. Prerequisite, Acct. 102 s.

Accounting for partnerships, ventures, insurance, receiverships, branches, consolidations, mergers, foreign exchange, estates and trusts, budgets, and public accounts. Wedeberg.

**Acct. 182 s. Specialized Accounting (3)**—Three lectures. Prerequisite, Acct. 181 f.

A study of the accounting methods and problems of the following types of business: savings banks, commercial banks, national banks, building and loan associations, stock brokerage, consignments, department stores, real estate, extractive industries, hotels, government, electric utilities, and others. Wedeberg.

**Acct. 186 s. C. P. A. Problems (3)**—Three lectures. Prerequisite, consent of instructor.

This course is arranged to coordinate all previous work in accounting with special emphasis on the solution of practical C. P. A. problems and the discussion of C. P. A. theory. Wedeberg.

#### COURSES FOR GRADUATES

**Acct. 228 f, 229 s. Accounting Systems (3, 3).** Prerequisites, Acct. 181 and 182, or concurrent registration therein.

A discussion of the more difficult problems in connection with the industries covered in Acct. 181 and 182. Also includes the statement of affairs; realization and liquidation account; parent and subsidiary accounting; and financing. Wedeberg.

**Acct. 299 f or s. Special Problems in Accounting. (3).** Prerequisite, preliminary courses in the field of specialization, and permission of the instructor. Wedeberg.

**B. Finance****COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**Finance 105 f.\* Consumer Financing (3)**—Prerequisite, Econ. 51 y or 57.

The economics of installment selling; methods of financing the consumer; operations of the personal finance company. Gruchy.

**Finance 106 f. Public Finance (3)**—Prerequisite, Econ. 51 y or 57.

The nature of public expenditures; sources of revenue; taxation; and budgeting. Special emphasis on the practical, social, and economic problems involved. Gruchy.

**Finance 111 s. Corporation Finance (3)**—Prerequisite, Econ. 51 y.

The organization and financing of a business enterprise. Types of securities and their utilization in apportioning income, risk, and control. Problems of capitalization, refunding, reorganization, and expansion. Procurement of capital. Public regulation of the sale of securities. Stevens.

**Finance 115 f. Investments (3)**—Prerequisite, Finance 111 s.

Sources of information for the investor. Classes of investments, government bonds, municipals, real estate mortgages, public utilities, railroads, industrial securities, movement of security prices, analysis of financial statements. Adapting the investment policy to the purpose and needs of the investor. Stevens, Mullin.

**Finance 116 s.\* Investment Banking (3).**

A study of the functions and operations of investment banking institutions and their relation to the market for long-term credit and with emphasis on the trends and problems of investment banking.

**Finance 118 f.\* Stock and Commodity Exchanges (3).**

An analysis of the operations of the various exchanges. Brokerage houses and methods of trading. Regulation of the exchanges.

**Finance 121 s.\* Advanced Banking Principles and Practices (3).**

The incorporation, organization, and operation of banks. Functions of departments and problems of customer relations. Bank legislation and governmental regulation. Gruchy.

**Finance 125 f.\* Credits and Collections (3).**

Nature and function of credit and use of credit instruments. Principles of credit investigation and analysis. The work of the credit manager. Gruchy.

**Finance 129 f.\* International Finance (3).**

Foreign exchange theory and practice. International aspects of monetary and banking problems. International money markets. The gold problem and The Bank For International Settlements. Gruchy.

**Finance 141 f. Insurance (3)**—Prerequisite, Econ. 51y.

A survey of the major principles and practices of life and property insurance, with special reference to their relationship to our social and economic life.

**Finance 151 s.\* Real Estate (3)**—Prerequisite, Econ. 51 y.

The principles and practices involved in owning, operating, merchandising, leasing, and appraising real estate and real estate investments.

**Finance 199 s. Financial Analysis and Control (3)**—Prerequisite, Finance 111 f.

Internal administration of a business from the viewpoint of the chief executive. Departmentalization and functionalization, anticipation and budgetary control of sales, purchases, production, inventory, expenses, and assets. The coordination of financial administration. Policy determination, analysis and testing. Stevens.

#### COURSES FOR GRADUATES

**Finance 201 f, 202 s. Research (1-3).** Credit in proportion to work accomplished. Students must be especially qualified by previous work to pursue effectively the research to be undertaken. Gruchy.

**Finance 229 f or s. Special Problems in Finance (1-3).** Prerequisite, preliminary courses in the field of specialization and permission of the instructor concerned.

Individual study of specific problems.

Stevens, Gruchy.

#### C. Marketing

See also related courses in Psychology, especially Psych. 4 s, 140 f, and 141 s, and in the marketing of agricultural products, particularly A. E. 101 s, 102 s, 103 s, 105 s, and 215 s.

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Mkt. 101 f. Marketing Principles (3)**—Prerequisite, Econ. 51 y.

A study of the fundamental principles of assembling and dispersing manufactured goods; functions of wholesale and retail middlemen; branch house distribution; mail order and chain store distribution; price and price policies; cash and quality discounts; price maintenance; and a discussion of the problem of distribution costs. Reid.

**Mkt. 105 s. Salesmanship and Salesmanagement (3)**—Prerequisite, Econ. 51 y or 57, and Mkt. 101 f.

An analysis of the fundamental principles of salesmanship and the technique of personal presentation of ideas, goods, and services. Analysis of customer buying motives, habits, and sales reactions. The structure and function of the sales organization and its relation to the activities of the production and other departments. Building, training, equipping, stimulating and supervising a sales force. Reid.

**Mkt. 109 f.\* Advertising Principles (3)**—Prerequisite, Econ. 51 y or 57.

Functions and economic implications of advertising; selection and adaptation of media to various lines of business. Layouts, copywriting, and campaign planning. Objectives, appropriations, and measurements of effectiveness.

Mullin.

**Mkt. 115 s.\* Purchasing Technique (3).**

Ascertaining sources of supply, substitutes. Utilization of catalogues, files, pooled information, and cooperative purchasing. Buying on specifications. Sampling, testing, bargaining. Terms, discounts, relations with salesmen. Procurement, analysis, and interpretation of market and price data. Materials control. Interdepartmental and office organization. Reid.

**Mkt. 119 s.\* Retail Store Management and Merchandising (3)—Prerequisite, Mkt. 101 f.**

Retail store organization, location, and store policy; pricing policies, price lines, brands, credit policies; records as a guide to buying; budgetary control of inventory and expenses; purchasing methods; supervision of selling; training and supervision of retail sales force; administrative problems.

**Mkt. 199 s.\* Marketing Research and Market Policies (3)—Prerequisite, nine credit hours in marketing.**

A study of the methods and problems involved in marketing research.

Stevens, Reid.

## COURSES FOR GRADUATES

**Mkt. 201 f, 202 s. Research (1-3)**—Credit in proportion to work accomplished. Students must be especially qualified by previous work to pursue effectively the research to be undertaken. Marketing Staff.

**Mkt. 229 f or s. Problems in Marketing (1-3)**—Prerequisite, preliminary courses in the field of specialization, and permission of the instructor.

Individual study of specific problems.

Marketing Staff.

## D. Trade and Transportation

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**T. & T. 101 f. Principles of Foreign Trade (3)**—Prerequisite, Econ. 51 y, T. & T. 1 f, 4 s.

The basic principles of import and export trade, as influenced by the differences in methods of conducting domestic and foreign commerce. Daniels.

**T. & T. 111 f.\* Inland Transportation (3)**—Prerequisite, Econ. 51 y or 57.

The development of railway and truck transportation in the United States. Facilities for transporting agricultural and industrial products. Rate structures and tariffs. Effects of changing transportation methods upon agricultural and business organization. Daniels.

**T. & T. 112 s.\* Ocean Transportation (2)**—Prerequisite, T. & T. 1 f, 4 s.

The development of merchant marine and ocean trade routes; the function of the merchant marine in the present commerce of the world; relation of merchant marine to the railroad and other transportation agencies. Special stress is laid on the history and present position of the American Merchant Marine.

**T. & T. 121 s.\* The Technique of Export Trade (1)**—Prerequisite, T. & T. 101 f.

Practical problems of exporting, including the study of functions of the various exporting agencies; documents and procedures used in exporting transactions. Daniels.

**T. & T. 122 s.\* The Technique of Import Trade (1)**—Prerequisite, T. & T. 101 f.

The study of methods of procuring goods in foreign countries; financing of import shipments; documentary procedures; clearing through the customs districts; and distribution of goods in the United States. Daniels.

**T. & T. 123 s.\* Import and Export Practice (1-2)**—Prerequisite, concurrent registration in T. & T. 121 s or 122 f.

Practice work in dealing with import and export documents. Field trips are also arranged to Baltimore to study actual import and export procedure. A nominal fee is collected at the time of the field trip to cover the expenses incurred. Daniels.

#### FOREIGN TRADING AREAS:

The following three courses apply to particular areas the analysis of foreign markets and methods discussed in Principles of Foreign Trade (T. & T. 101 f). Lecture hours are arranged in such a way that these courses may be taken as a group, or any one or more may be taken independently.

**T. & T. 131 f.\* Europe as An Export Field (1)**—Prerequisite, T. & T. 101, 123.

An analysis of the countries of Europe as a market for American goods, including a study of the various products imported, methods of financing, and distribution agencies.

**T. & T. 132 f.\* Latin America as An Export Field (1)**—Prerequisite, T. & T. 101, 123.

An analysis of the countries of Central and South America as a market for American goods, including a study of the various products imported, methods of financing, and distribution agencies.

**T. & T. 133 f.\* Asia as An Export Field (1)**—Prerequisite, T. & T. 101, 123.

An analysis of the countries of Asia as a market for American goods, including a study of the various products imported, methods of financing, and distribution agencies.

**T. & T. 189 s.\* International Commerce and Commercial Policy (3)**—Prerequisite, T. & T. 131, 132, 133.

Production, availability, and world commerce in the staple commodities of world trade: agricultural, mineral, and manufactured; and the effects of the principal commercial policies and treaties. Daniels.

#### COURSES FOR GRADUATES

**T. & T. 229 s. Special Problems in Foreign Trade (1-3)**—Prerequisite, preliminary courses in the field of specialization, and permission of the instructor. Daniels, Reid.



**E. Organization and Management**

See also related courses in Psychology, especially Psych. 3 s, 160 f, and 161 s.

**COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**O. M. 101 f, 102 s. Business Law (3 each semester).** Section A is limited to majors in Accounting, or those who have consent of the instructor.

Legal aspects of business relationships, contracts, negotiable instruments, agency, partnerships, corporations, real and personal property, and sales. Section A is a more intensive treatment of the law of contracts, sales, negotiable instruments, agency and partnerships than is given in Section B, and is designed to prepare students for the accounting profession in Maryland. Layton.

**O. & M. 103 f. Advanced Business Law (3)**—Prerequisite, O. & M. 101 and 102, Section A.

The principles of the law of corporations, trusts, and the administration of the estates of bankrupts and decedents, presented in a manner calculated to prepare students for the accounting profession in Maryland. Layton.

**O. & M. 110 f. Fundamentals of Business Administration (2)**—Primarily for senior engineers. Graduate students majoring in non-economic subjects may be admitted by special consent of instructor.

An analysis of the business structure, showing the functions of production, marketing, and finance, and the use of the tools of accounting and statistics. Designed to show the engineer his relationship as a functional expert to other functional experts and to give an academic opportunity to apply technical knowledge in business problems. Layton.

**O. & M. 121 s. Industrial Management (3)**—Prerequisite, Econ. 51 y or 57.

A study of major problems of management in the acquisition, organization, and control of the factors and agents of production—plant, machinery and equipment, raw materials, and personnel. Factory location and layout. Scheduling. Personnel organization and incentives.

**O. & M. 161 s. Problems in Cooperative Administration (1-3)**—Prerequisites, six semester hours in accounting, three in finance, eight in economics, three in statistics, three in organization and management, and three in cooperative theory.

A seminar course in the practical problems of cooperative management that is intended to integrate previous managerial courses. A limited amount of travel is required, for which a nominal fee is collected at the time of each field trip to cover the expenses incurred. Stevens.

**COURSES FOR GRADUATES**

**O. & M. 201 f, 202 s. Research (1-3)**—Credit in proportion to work accomplished. Student must be especially qualified by previous work to pursue effectively the research to be undertaken.

Investigation or original research in problems of business organization and operation under supervision of the instructor. Staff.

**O. & M. 208 s. Legal Aspects of Business Problems (2).** Prerequisites, six semester hours in commercial law, twelve in accounting, nine in economics and six in political science.

Law as an institution conditioning economic behavior. The law applicable to problems in management and production, marketing, and finance.

Layton.

**O. & M. 291 f or s. Problems in Business Organization (1-3).** Prerequisites, preliminary courses in the field of specialization, six semester hours in organization and management, eight in accounting, nine in economics, and three in statistics.

Individual investigation of specific problems, under direction of the instructor. The subjects selected for investigation may be closely allied with, but must not be the same as, the subject discussed in the student's major thesis.

Layton.

## CHEMISTRY

### A. General Chemistry

#### COURSES FOR GRADUATES

**Chem. 200 A y. Chemistry of the Rarer Elements (4)**—Two lectures. Prerequisite, Chem. 2 y.

A course devoted to the study of the elements not usually considered in the elementary course.

White.

**Chem. 200 B y. Advanced Inorganic Laboratory (4)**—Two laboratories. Prerequisite, consent of the instructor.

A laboratory study of the compounds of elements considered in Chem. 200 A y.

White.

**Chem. 201 f or s. An Introduction to Spectrographic Analysis (1)**—A laboratory course designed to acquaint the student with the fundamentals of spectrographic analysis.

White.

**Chem. 202 y. Theory of Solutions (4)**—Two lectures. Prerequisite, Chem. 102 A y.

A systematic study of the theories and properties of solutions. Subjects considered are solubility, regular solutions, dipole moments, solution kinetics, and modern theories of dilute and concentrated electrolytes.

Svirbely.

**Chem. 230 f. Chemical Microscopy (2 or 4).**

A laboratory course designed to acquaint the student with the fundamentals of microscopic analysis.

Svirbely.

### B. Analytical Chemistry

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 101 y. Advanced Quantitative Analysis (10)**—Two lectures; three laboratories. Prerequisite, Chem. 6 y, or its equivalent.

A broad survey of the field of inorganic quantitative analysis. The first semester is devoted to mineral analysis, including the analysis of silicates and carbonates. The second semester is devoted to a study of the analysis of iron, steel, and such other materials as best fit the needs of the individual student.

Wiley.

#### COURSES FOR GRADUATES

**Chem. 240 y. Special Problems in Quantitative Analysis (4)**—Prerequisite, Chem. 6 y. Laboratory work and conferences.

A complete treatment of some special problem or problems, chosen to meet the needs and interest of the individual student.

Wiley.

#### C. Organic Chemistry

##### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 116 y. Advanced Organic Chemistry (4)**—Two lectures. Prerequisite, Chem. 8 A y and B y, or their equivalent.

A course devoted to a more advanced study of the compounds of carbon than is undertaken in Chem. 8 A y. Graduate students who desire an accompanying laboratory course should elect Chem. 210 y.

Drake.

**Chem. 117 y. Organic Laboratory (2)**—One laboratory.

A course devoted to an elementary study of organic qualitative analysis. The work includes the identification of unknown organic compounds, and corresponds to the more extended course, Chem. 207.

Williams.

**Chem. 118 y. Advanced Organic Laboratory (2)**—One laboratory.

A study of organic quantitative analysis and the preparation of organic compounds. Quantitative determinations of carbon and hydrogen, nitrogen, and halogen are carried out, and representative syntheses, more difficult than those of Chem. 8 B y, are studied.

Williams.

##### COURSES FOR GRADUATES

**Chem. 203 A f. Stereochemistry (2)**—Two lectures. (Not offered 1939-1940.)

A comprehensive study of stereoisomerism.

Drake.

**Chem. 203 B f. The Organic Chemistry of Nitrogen (2)**—Two lectures. (Not offered 1939-1940.)

An advanced study of the more important organic compounds containing nitrogen.

Drake.

**Chem. 203 C f. The Chemistry of Certain Natural Products (2)**—Two lectures.

A study of the structure and reactions of various naturally occurring substances.

Drake.



**Chem. 205 f or s. Organic Preparations (4)**

A laboratory course, devoted to the synthesis of various organic compounds, and designed to fit the needs of students whose laboratory experience has been insufficient to enable them to pursue research in organic chemistry. Williams.

**Chem. 206 f or s. Organic Microanalysis (4).** Prerequisite, consent of the instructor.

A laboratory study of the methods of Pregl for the quantitative determination of halogen, nitrogen, carbon and hydrogen, and methoxyl. Drake.

**Chem. 207 f or s. Organic Qualitative Analysis (2-6).**

Laboratory work devoted to the identification of pure organic substances and of mixtures. This course serves as an intensive preparation for problems of identification encountered in organic research, and should be taken by all students planning to do research in organic chemistry. Williams.

**Chem. 210 y. Advanced Organic Laboratory (4 or 6).** Students electing this course should elect Chem 116 y.

The content of the course is essentially that of Chem. 117 y and 118 y, but may be varied within wide limits to fit the needs of the individual student. Williams.

**Chem. 235 A s. Thermal Reactions of Organic Substances (2)—Two lectures.** (Not offered 1939-1940.)

A study of decompositions, rearrangements, and condensations induced by heat. Williams.

**Chem. 235 B s. Physical Aspects of Organic Chemistry (2)—Two lectures.**

The practical applications of modern theories of physics and physical chemistry to the problems of structure and reactions of organic substances. Williams.

**Chem. 235 C s. The Chemistry of the Carbohydrates (2)—Two lectures.** (Not offered 1939-1940.)

A study of the sugars, the polysaccharides, and their derivatives. Williams.

## D. Physical Chemistry

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 102 A y. Physical Chemistry (6)—Three lectures.** Prerequisites, Chem. 6 y; Phys. 2 y; Math. 16 y. Graduate students will elect Chem. 219 f and s.

This course aims to furnish the student with a thorough background in the laws of theories of chemistry. The gas laws, kinetic theory, liquids, solutions, elementary thermodynamics, thermochemistry, equilibrium, chemical kinetics, etc., will be discussed. Haring.

**Chem. 103 A y. Elements of Physical Chemistry (4)—Two lectures.** Prerequisites, Chem. 1 y, Phys. 1 y, Math. 8 f and 10 s or 21 f and 22 s.

The course is designed to meet the needs of premedical students and others unable to pursue the subject further. Accordingly such topics as solution

theory, colloid chemistry, reaction rates, equilibrium, the methods of determining pH, etc. are stressed. Lamb.

**Chem. 103 B y. Elements of Physical Chemistry Laboratory (2)**—One laboratory. This course must be taken by undergraduates enrolled in Chem. 103 A y. Prerequisite, Chem. 4 f or s.

Numerous quantitative experiments illustrating the principles discussed in Chem. 103 A y are performed. Lamb.

**Chem. 105 y. Elements of Chemical Thermodynamics (4)**—Two lectures. Prerequisite, Chem. 102 A y.

This course is designed for Chemical Engineering majors and is less extensive than Chem. 218 y but with suitable emphasis on all pertinent topics. Haring.

#### COURSES FOR GRADUATES

**NOTE:** All courses in this group have, as prerequisites, Chem. 102 A y for lecture courses and Chem. 102 B y for laboratory courses, or their equivalents.

**Chem. 212 A f and s. Colloid Chemistry (4)**—Two lectures.

A discussion of the effects of surface on chemical reactions with numerous practical applications. Haring.

**Chem. 212 B f and s. Colloid Chemistry Laboratory (4)**—Two laboratories, which must accompany or be preceded by Chem. 212 A f. and s. Haring.

**Chem. 213 f. Phase Rule (2)**—Two lectures. (Not given in 1939-1940.)

A systematic study of heterogeneous equilibria. One, two, and three component systems will be considered, with practical applications of each.

Haring.

**Chem. 214 f and s. Structure of Matter (4)**—Two lectures.

A study of the structure of atoms, molecules, solids and liquids. Molecular structure and related topics will be studied from the standpoints of dipole moments, Raman spectra and infra-red spectra. Lamb.

**Chem. 215 s. Catalysis (2)**—Two lectures. (Not given in 1939-1940.)

This course consists of lectures on the theory and applications of catalysis. Haring.

**Chem. 216 f and s. Reaction Kinetics (4)**—Two lectures. (Not given in 1939-1940.)

A study of reaction velocity and mechanisms of reactions in gaseous and liquid systems, and the effect of temperature, radiation, etc. on the same. Lamb.

**Chem. 217 A f and s. Electrochemistry (4)**—Two lectures. (Not given in 1939-1940.)

A theoretical discussion coupled with practical applications. Haring.

**Chem. 217 B f and s. Electrochemistry Laboratory (4)**—Two laboratories, which must accompany or be preceded by Chem. 217 A f and s. (Not given in 1939-1940.) Haring.

**Chem. 218 y. Chemical Thermodynamics (4)**—Two lectures.

A study of the methods of approaching chemical problems through the laws of energy. Haring.

**Chem. 219 f and s. Physical Chemistry Laboratory (4 or 6)**—Two laboratories and one conference.

Students taking this course may elect 6 credits of lectures in Chem. 102 A y to replace the conference. Lamb.

### E. Biological Chemistry

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 108 f or s. General Physiological Chemistry (4)**—Two lectures; two laboratories. Prerequisites, Chem. 12 A y and Chem. 12 B y or their equivalent.

This course is a study of the fundamental principles of human nutrition, the chemistry of foods, digestion, absorption, assimilation, metabolism, tissue composition and excretion. The laboratory work consists of experiments in food analysis, salivary, gastric, pancreatic and intestinal digestion, and identification of components of blood and urine. Supplee.

**Chem. 115 y. Food Analysis (4)**—Two laboratories. (By special arrangement a student may take this course one semester for two hours credit.) Prerequisite, Chem. 12 A y and Chem. 12 B y or their equivalent.

This course is designed to give the student experience in analytical procedures of particular benefit to workers in the food industries. Particular attention is given to the problems presented in sampling, and in applying standard methods to different types of products. Analytical determinations of value in detecting and estimating various types of decomposition are also stressed. Supplee.

#### COURSES FOR GRADUATES

**Chem. 208 f or s. Biological Analysis (2)**—Two laboratories.

A course in analytical methods of value to the student whose major field is in the biological sciences. The work is varied somewhat to fit the needs or interest of the individual student. Supplee.

**Chem. 223 A f and s. Physiological Chemistry (4)**—Two lectures. Prerequisites, Chem. 12 A y and Chem. 12 B y or their equivalent.

An advanced course in physiological chemistry. For the first semester the course consists of lectures and assigned reading on the chemistry of the carbohydrates, fats, proteins and enzymes. The second semester deals with digestion, absorption, metabolism, excretion, hormones and nutrition. Supplee.

**Chem. 223 B f and s. Physiological Chemistry Laboratory (4)**—Two laboratories. Prerequisites, Chem. 4 f or s and 12 A y and 12 B y or their equivalent.

A laboratory course to accompany Chem. 223 A f and s. Qualitative and quantitative food analysis; digestion, nutrition, metabolism, and respiration experiments; and quantitative analysis of the blood and urine. Supplee.

**Chem. 224 f or s. Special Problems (4-8)**—A total of eight credit hours may be obtained in this course by continuing the course for two semesters. Laboratory, library, and conference work amounting to a minimum of 10 hours a week. Prerequisites, Chem. 223 A f and s and consent of the instructor.

This course consists of studies of special methods, such as the separation of the fatty acids from a selected fat, the preparation of carbohydrates or amino acids, the determination of the distribution of nitrogen in a protein or the detailed analysis of some specific type of tissue. The student will choose the particular problem to be studied with the advice of the instructor.

Broughton.

## F. History of Chemistry

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Chem. 121 y. The History of Chemistry (2)**—One lecture. Prerequisite, Chem. 1 y and Chem. 8 y, or their equivalent.

The development of chemical knowledge, and especially of the general doctrines of chemistry which have been gradually evolved, from their earliest beginnings up to the present day.

Staff.

## G. Seminar and Research

### COURSES FOR GRADUATES

**Chem. 228 f and s. Seminar (2).** Required of all graduate students in chemistry.

Students are required to prepare reports on papers in the current literature. These are discussed in connection with the recent advances in the subject.

Staff.

**Chem. 229. Research in Chemistry.** The investigation of special problems and the preparation of a thesis towards an advanced degree.

Staff.

## CHEMICAL ENGINEERING

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Ch. E. 102 s. Water, Fuels, and Lubricants (3 or 4)**—Two lectures; one or two laboratories. Prerequisites, Chem. 8 A y and 8 B y, Phys. 2 y.

Laboratory work consists of exercises in the usual control methods for testing water, fuels, and lubricants, and some related engineering materials.

**Ch. E. 103 y. Elements of Chemical Engineering (6)**—Three lectures. Prerequisites, Chem. 8 A y and 8 B y, Phys. 2 y.

Theoretical discussion of general underlying philosophy and methods in chemical engineering, such as presentation of data, material balances, and heat balances. Illustrated by consideration of typical unit operations, including problems.

**Ch. E. 104 y. Chemical Engineering Seminar (2).** Required of all students in chemical engineering.

Students prepare reports on current problems in chemical engineering and participate in the discussion of such reports.

**Ch. E. 105 y. Advanced Unit Operations (10)**—Two lectures; three laboratories. Prerequisite, Ch. E. 103 y and Chem. 102 A y.

Advanced theoretical treatment of fluid flow, heat flow, evaporation, humidity, distillation, absorption, scrubbing, and analogous unit operations typical of chemical engineering. Problems and laboratory operation of small scale semi-commercial type equipment. A comprehensive problem involving theory and laboratory operations is included to illustrate the development of a plant design problem that requires the utilization of a number of the fundamental topics.

**Ch. E. 106 y. Minor Problems (13).** Prerequisite, completion of third year chemical engineering course or permission of Department of Chemical Engineering.

Original work on a special problem assigned to each student, including preparation of a complete report covering the study.

**Ch. E. 107 y. Fuels and their Utilization (4).** Two lectures. Prerequisite, completion of third year chemical engineering course or permission of Department of Chemical Engineering.

A study of the sources of solid, liquid, and gaseous fuels, their economic conversion, distribution, and utilization. Problems.

**Ch. E. 108 y. Chemical Technology (4)**—Two lectures. Prerequisite, Ch. E. 103 y. Also open to advanced students in chemistry.

A study of the principal chemical industries. Plant inspections, trips, reports, and problems.

#### COURSES FOR GRADUATES

**Ch. E. 201 y. Graduate Unit Operations (10 or more).** Prerequisite, permission of Department of Chemical Engineering.

Advanced theoretical treatment of typical unit operations in chemical engineering. Problems. Laboratory operation of small scale semi-commercial type equipment with supplementary reading, conferences and reports. Huff.

**Ch. E. 202 s. Gas Analysis (3)**—One lecture; two laboratories. Prerequisite, permission of Department of Chemical Engineering.

Quantitative determination of common gases, fuel gases, gaseous vapors and important gaseous impurities. Problems. Machwart.

**Ch. E. 207 A f, 208 A s. Plant Design Studies (3, 3).** Three lectures.

An examination of the fundamentals entering into the selection of processes, the specifications for and choice and location of equipment and plant sites. Problems.

**Ch. E. 207 B f, 208 B s. Plant Design Studies Laboratory (2, 2).** Six hours



of laboratory work which may be elected, to accompany or to follow Ch. E. 207 A and 208 A.

**Ch. E. 209 y. Gaseous Fuels (4).** Two lectures. Prerequisite, permission of Department of Chemical Engineering. An advanced treatment of some of the underlying scientific principles involved in the production, transmission, and utilization of gaseous fuels. Problem in the design and selection of equipment.

**Ch. E. 203 f, 204 s. Graduate Seminar (1, 1).** Required of all graduate students in chemical engineering.

Students prepare reports on current problems in chemical engineering and participate in the discussion of such reports. Staff.

**Ch. E. 205 f, 206 s. Research in Chemical Engineering.**

The investigation of special problems and the preparation of a thesis in partial fulfillment of the requirements of an advanced degree.

## COMPARATIVE LITERATURE

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

The work in Comparative Literature is offered jointly by the faculties of the Department of English and the Department of Modern Languages.

A minor only may be taken in Comparative Literature. English 113 f. and 114 s may be counted as Comparative Literature by students who have had Comparative Literature 105 f and 106 s. English 124 s may also be counted as Comparative Literature.

**Comp. Lit. 101 f. Introductory Survey of Comparative Literature (3)**—Three lectures.

Survey of the background of European literature through study in English translations of Greek and Latin literature. Special emphasis is laid on Greek drama along with the development of the epic, tragedy, comedy, and other typical forms of literary expression. The debt of modern literature to the ancients is discussed and illustrated. Zucker.

**Comp. Lit. 102 s. Introductory Survey of Comparative Literature (3)**—Three lectures.

Continuation of Comp. Lit. 101 f; study of medieval and modern Continental literature. Zucker.

**Comp. Lit. 103 f. Types of World Literature (2)**—Two lectures.

An historical and critical survey of the principal types of world literature, with special attention to the influence of classical myth and legend and of classical literary ideals upon English and American writers. Harman.

**Comp. Lit. 104 s. The Old Testament as Literature (2)**—Two lectures.

A study of the sources, development, and literary types. Hale.

**Comp. Lit. 105 f. Romanticism in France (3)**—Three lectures.

Lectures and readings in the French romantic writers from Rousseau to Baudelaire. Texts are read in English translations. Wilcox.

**Comp. Lit. 106 s. Romanticism in Germany (3)**—Three lectures.

Continuation of Comp. Lit. 105 f. German literature from Buerger to Heine. The reading is done in English translations. Prahl.

**Comp. Lit. 107 f. The Faust Legend in English and German Literature (2)**—Two lectures.

A study of the Faust Legend of the Middle Ages and its later treatment by Marlowe in *Dr. Faustus* and by Goethe in *Faust*. Prahl.

**Comp. Lit. 112 f. Ibsen (2)**—Two lectures.

A study of the life and chief works of Ibsen with special emphasis on his influence on the modern drama. Zucker.

#### COURSES FOR GRADUATES

**Comp. Lit. 200 s. The History of the Theatre (2)**—Two lectures. Prerequisite, a wide acquaintance with modern drama and some knowledge of the Greek drama.

A detailed study of the history of the European theatre. Individual research problems will be assigned for term papers. Hale.

#### DAIRY HUSBANDRY

##### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**D. H. 101 f. Dairy Cattle Feeding and Herd Management (3)**—Two lectures; one laboratory. Prerequisites, D. H. 1 f, D. H. 21 s, and A. H. 102 f.

A comprehensive course in dairy cattle feeding and herd management designed for advanced students in dairy husbandry. It covers the efficient feeding of the dairy herd, including milking cows, dairy heifers, calves, and dairy bulls; common diseases of dairy cattle and their treatment; dairy farm sanitation; problems of herd management; dairy barns and equipment; and the factors essential for success in the dairy farm business. Turk.

**D. H. 105 s. Dairy Breeds and Breeding (2)**—One lecture; one laboratory. Prerequisite, D. H. 2 s.

A study of the historical background, characteristics, noted individuals and families, and the more important blood lines in the Holstein, Guernsey, Ayrshire and Jersey breeds. Berry.

**D. H. 108 f. Dairy Manufacturing (5)**—Two lectures; two 4-hour laboratories. Prerequisites, D. H. 1 f and Bact. 1.

The principles and practice of making casein, cheese and butter, including a study of the physical, chemical and biological factors involved. Laboratory practice will include visits to commercial factories. England.

**D. H. 109 s. Dairy Manufacturing (5)**—Two lectures; two 4-hour laboratories. Prerequisites, D. H. 1 f and Bact. 1.

The principles and practice of making condensed milk and milk powder, and ice cream, including a study of the physical, chemical and biological factors involved. Laboratory practice will include visits to commercial factories.  
England.

**D. H. 110 f. Market Milk (5)**—Three lectures; two laboratories. Prerequisites, D. H. 1 f and Bact. 1. (Not given in 1939-1940.)

Commercial and economic phases of market milk, with special reference to its transportation; processing and distribution; certified milk; commercial buttermilk; milk laws; duties of milk inspectors; distribution; milk plant construction and operation. Laboratory practice includes visits to local dairies.  
England.

**D. H. 111 s. Analysis of Dairy Products (3)**—One lecture; one 4-hour laboratory. Prerequisites, D. H. 1 f, Bact. 1, Chem. 4 f or s, Chem. 12 y.

The application of chemical and bacteriological methods to commercial dairy practice; analysis by standard chemical, bacteriological, and factory methods; standardization and composition control; tests for adulterants and preservatives.  
England.

**D. H. 119 f, 120 s. Dairy Literature (1, 1)**—One lecture. Prerequisite, D. H. 1 f and D. H. 2 s.

Presentation and discussion of current literature in dairying.

England, Berry.

**D. H. 121 y. Methods of Dairy Research (1-3)**. Credit in accordance with the amount and character of work done.

This course is designed especially to meet the needs of those dairy students who plan to enter the research or technical field of dairying. Methods of conducting dairy research and the presentation of results are stressed. A research problem which relates specifically to the work the student is pursuing will be assigned.  
England, Berry.

#### COURSES FOR GRADUATES

**D. H. 201 f. Advanced Dairy Production (3)**.

A study of the newer discoveries in animal nutrition, breeding, and management. Readings and assignments.  
Turk.

**D. H. 205 f or s. Seminar (1)**.

Students are required to prepare papers based upon research in progress or completed for presentation before and discussion by the class.  
Staff.

**D. H. 203 s. Milk Products (2)**—Two lectures.

An advanced consideration of the scientific and technical aspects of milk products.  
England.

**D. H. 204 f or s. Special Problems in Dairying (1-3)**—Credit in accordance with the amount and character of work done.

Special problems which relate specifically to the work the student is pursuing will be assigned.  
Staff.

**D. H. 202 f. Dairy Technology (2)**—Two lectures.

A consideration of milk and dairy products from the physio-chemical point of view. England.

**D. H. 206. Research.**—Credit to be determined by the amount and quality of work done.

The student will be required to pursue, with the approval of the head of the department, an original investigation in some phase of dairy husbandry, carry the same to completion, and report results in the form of a thesis.

Meade, Turk, England.

## ECONOMICS

Some of the specialized courses in the following lists may be offered only in alternate years, whenever prospective enrollments therein do not justify repeating annually. Such courses are indicated by an asterisk.

See also related courses in Business Administration and in Agricultural Economics.

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Econ. 130 f. Labor Economics (3).** Prerequisite, Econ. 51 y or 57.

Insecurity, wages and income, hours, substandard workers, industrial conflict; wage theories; the economics of collective bargaining; unionism in its structural and functional aspects; recent developments. Marshall.

**Econ. 131 s.\* Labor and Government (3).** Prerequisite, Econ. 51 y. (Probably not offered in 1939-1940.)

A study of society's efforts through legislation to improve labor conditions. State and federal laws and court decisions affecting wages, hours, working conditions, immigration, convict labor, union activities, industrial disputes, collective bargaining, and economic security. Marshall.

**Econ. 133 f.\* Industrial Relations (3).** Prerequisite, Econ. 51 y.

A study of the development and methods of organized groups in industry with reference to the settlement of labor disputes. An economic and legal analysis of labor union and employer association activities, arbitration, mediation, and conciliation; collective bargaining, trade agreements, strikes, boycotts, lockouts, company unions, employee representation, and injunctions. Marshall.

**Econ. 136 s.\* Economics of Consumption (3).** Prerequisite, Econ. 51 y or 57.

The place of the consumer in our economic system. An analysis of demand for consumer goods. The need for consumer-consciousness and a technique of consumption. Cooperative and governmental agencies for consumers. Special problems. Marshall.

**Econ. 145 s.\* Public Utilities (3).** Prerequisite, Econ. 51 y or 57.

Economic and legal characteristics of the public utility status; problems of organization, production, marketing, and finance; public regulation and alternatives. Layton.

**Econ. 151 f.\* Theories of Economic Reform (3).** Prerequisite, Econ. 51 y.

An investigation of some of the more important social reform movements and programs of the modern era. The course begins with an examination and evaluation of the capitalistic system, followed by an analysis of alternative types of economic control. Marshall.

**Econ. 152 s.\* Social Control of Business (3).** Prerequisite, sophomore economics and O. & M. 101 and 102, or concurrent registration therein.

The reasons for, and the methods of avoidance, escape, and abuse of competition as a regulating force in business; social control as a substitute for, or as a modification of preservation of competition; law as an instrument of social control through administrative law and tribunals; the constitutional aspects of social control. Layton.

**Econ. 153 f.\* Industrial Combination (3).** Prerequisite, Econ. 51 y.

The development of industrial combinations in the United States; the causes which brought about the trust movement; trade and business methods employed by these combinations; types of big business; anti-trust legislation in this country and its effects.

**Econ. 161 f. Economics of Cooperative Organization (3).** Prerequisite, Econ. 51 y or 57.

Analysis of the principles and practice of cooperation in economic activity from the viewpoint of effective management and public interest. Potentialities, limitations, and management problems of consumer, producer, marketing, financial, and business men's cooperatives. Stevens.

**Econ. 191 s. Contemporary Economic Theory (3).**

A survey of recent trends in English, American and Continental economic thought with special attention paid to the institutionalists, the welfare economists, and the mathematical economists. Gruchy.

#### COURSES FOR GRADUATES

**Econ. 201 f, 202 s. Research (1-3).** Credit in proportion to work accomplished. Students must be especially qualified to pursue effectively the research to be undertaken. Staff.

**Econ. 203 y. Seminar (4).** Prerequisite, concurrent graduate major in economics or business administration, and consent of instructor.

Discussion of major problems in the field of economic theory, accounting, cooperation, or business. Staff.

**Econ. 205 f. History of Economic Thought (3).**

A study of the development of economic thought and theories, including the Ancients, the Greeks, the Romans, Scholasticism, Mercantilism, Physiocrats, Adam Smith and contemporaries, Malthus, Ricardo, and John Stuart Mill. Marshall.

**Econ. 206 s. Economic Theory in the Nineteenth Century (3).**

A study of the various schools of economic thought, particularly the classicists, the neo-classicists, the Austrians, and the socialists. Marshall.



**Econ. 210 f and s. Special Problems in Economic Investigation (1-3 each semester).** Credit in proportion to work accomplished. (Not offered in 1939-1940.)

Technique involved in economic research. Practice in drawing up schedules and programs. Individual conferences and reports. Stevens.

**Econ. 233 s. Problems in Industrial Relations (3).** Prerequisites, preliminary courses in the field of specialization, and permission of the instructor. The subjects selected for study may be closely allied with, but must not be the same as, the subject discussed in the student's major thesis. Marshall.

**Econ. 252 s. Problems in Government and Business Interrelations (3).** Prerequisites, preliminary courses in the field of specialization, and permission of the instructor. The subjects selected for study may be closely allied with, but must not be the same as, the subject discussed in the student's major thesis. Layton.

**Econ. 299 f and s. Problems in Economics of Cooperation (1-3 each semester).** Prerequisites, six semester hours in accounting, three in finance, three in statistics, eight in economics and three in cooperative theory. Problems may involve practical work with the National Cooperative Council and other Washington, D. C., or Maryland cooperative organizations. The subjects selected for investigation may be closely allied with, but must not be the same as, the subject discussed in the student's major thesis. Stevens.

## EDUCATION

### A. History and Principles

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Ed. 100 f. The Development of American Educational Institutions (2).**

The course traces the origins and development of the concepts and practices which now characterize contemporary American education. The elementary and secondary schools, teacher training, and higher education will be considered, as well as the emergence of the junior high school and the junior college. Long.

**Ed. 101 f. History of Education: Greco-Roman, Medieval, and Early Modern Education (2).**

A survey of the evolution in Europe of educational theory, institutions, and practices from the Greco-Roman era to 1750. Long.

**Ed. 102 s. History of Modern Education (2).** Continuation of Ed. 101 f.

The survey of the modern period is directed to the creators of modern education and the bases on which modern educational systems have been founded in various countries. Long.

**Ed. 103 s. The High School (3).**

The secondary school population, its nature and needs; the school as an instrument of society; relation of the secondary school to other schools; aims of secondary education; curriculum and method in relation to aims; extra-

curricular activities; guidance and placement; the school's opportunities for service to its community; teacher certification and employment in Maryland and the District of Columbia. Brechbill.

**Ed. 105 f. Educational Measurements (3)**—Prerequisite, consent of instructor.

A study of tests and examinations with emphasis upon their construction and use. Types of tests; purposes of testing; elementary statistical concepts, and processes used in summarizing and analyzing test results; school marks. Brechbill.

**Ed. 107 f. Comparative Education (Europe) (2).**

The forces that cause different systems of education, and the characteristic differences in the educational policies and practices in various countries are studied in this course. The major emphasis is upon the principal European countries. Long.

**Ed. 110 f. The Junior High School (3).**

Definition and history of the junior high school; physical, mental, and social traits of the junior high school pupil; purposes, functions, and limitations; types of reorganized schools; articulation with lower and higher schools; duties and responsibilities of the administrative and teaching staff; the program of studies; exploratory courses; departmentalization; provisions for individual differences; the guidance program; significant problems and challenges implied in present trends. Powers.

**Ed. 111 f or s. Lives of Scientists (2).**

A study of the major achievements and interesting incidents in the lives of the pioneers of science. Though designed especially to provide enrichment material for the use of high school teachers, the course is of general cultural value. Brechbill.

**Ed. 193 f. Visual Education (2).**

Visual impressions in their relation to learning; investigations into the effectiveness of instruction by visual means; projection apparatus, its cost and operations; slides, film strips, and films; physical principles underlying projection; the integration of visual materials with organized courses of study; means of utilizing commercial moving pictures as an aid in realizing the aims of the school. Brechbill.

See also "Agricultural Education and Rural Life."

#### COURSES FOR GRADUATES

**Ed. 200 f. Organization and Administration of Public Education (2).**

This course deals objectively with the organization, administration, curricula, and present status of public education in the United States. Small.

**Ed. 201 s. Educational Interpretations (2).**

A study of the social, economic, political, and cultural environment in which American educational institutions and policies have developed, and of the function of education in environmental change. Small.

**Ed. 202 f. The Organization and Administration of Secondary Schools (2).**

This course will consider the principal's duties in relation to organization of secondary school units; selecting and assigning the staff; schedule making; school records and accounting systems; organization of guidance and extra-curricular activities; testing and the marking system; public relations and publicity; professional improvement.

Powers.

**Ed. 203 s. High School Supervision (2).**

This course will deal with the nature and functions of supervision in a modern school program; recent trends in supervisory theory and practice; teacher participation in the determination of policies; planning of supervisory programs; appraisal of teaching methods; curriculum reorganization and other direct and indirect means for the improvement of instruction.

Powers.

**Ed. 215 f and s. Seminar in Secondary Education (2-3).**

A study of pressing problems with which secondary education is faced at the present time.

Powers.

**Ed. 216 f. Seminar in Youth Problems (2).**

The major topics presented will concern the present status of youth; problems of equalizing educational opportunities; finding employment for youth; establishing economic security; guidance of youth; preparation for occupational efficiency; reorganization of general secondary education; training for constructive use of leisure; health education; implications for citizenship training; and community planning of youth programs.

Powers.

**Ed. 217 s. Research Problems in Youth Education (2).** For students who have had Ed. 216 f or equivalent preparation.

Each student will be required to select some one problem for special investigation. A satisfactory term report will be required before credit for the course will be allowed.

Powers.

**Ed. 250 y. Seminar in Education (2-4).**

In 1939-1940, the seminar will deal with two subjects. First semester: educational biography—chief contributors to theory and practice of American education. Second semester: the major educational foundations and associations.

Small and Staff.

See also "Agricultural Education and Rural Life."

**B. Educational Psychology**

See "Psychology."

**C. Methods in High School Subjects****COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

Graduate credit for courses in this section will be given only by special permission of the Department of Education.

**Ed. 120 s. English in the High School (2)**—Prerequisite, Psych. 10 f or s.

Objectives in English in the different types of high schools; selection and organization of subject-matter in terms of modern practice and group needs; evaluation of texts and references; bibliographies; methods of procedure and types of lessons; the use of auxiliary materials; lesson plans; measuring results.

Smith.

**Ed. 122 s. The Social Studies in the High School (2)**—Prerequisite, Psych. 10 f or s.

Selection and organization of subject-matter in relation to the objectives and present trends in the social studies; texts and bibliographies; methods of procedure and types of lessons; the use of auxiliary materials; lesson plans; measuring results.

**Ed. 124 s. Modern Language in the High School (2)**—Prerequisite, Psych. 10 f or s.

Objectives of modern language teaching in the high school; selection and organization of subject-matter in relation to modern practices and group needs; evaluation of texts and references; bibliographies; methods of procedure and types of lessons; lesson plans; special devices, measuring results.

**Ed. 126 s. Science in the High School (2)**—Prerequisite, Psych. 10 f or s.

Objectives of science teaching; their relation to the general objectives and secondary education; application of the principles of psychology and of teaching to the science class room situation; selection and organization of subject-matter; history, trends, and status; textbooks, reference works, and laboratory equipment; technique of class room and laboratory; measurement, standardized tests; professional organizations and literature. Brechbill.

**Ed. 128 s. Mathematics in the High School (2)**—Prerequisite, Psych. 10 f or s.

Objectives; the place of mathematics in secondary education; content and construction of courses; recent trends; textbooks and equipment; methods of instruction, measurements and standardized tests; professional organizations and literature. Brechbill.

**Ed. 130 f. High School Course of Study—Composition (2).**

Content and organization of the materials of written and oral composition in the junior and the senior high school. Smith.

**Ed. 131 s. High School Course of Study—Literature (2).**

Content and organization of the literature course in the junior and the senior high school. Smith.

**Ed. 135 f. High School Course of Study—Geometry (2).**

Content and organization of intuitive and demonstrative geometry. Methods of analysis and problem solving. Brechbill.

**Ed. 136 f. High School Course of Study—Biology (2).**

Content and organization of high school biology. Brechbill.

**Ed. 137 s. High School Course of Study—General Science (2).**

Content and organization of general science in the junior and the senior high school. Brechbill.

**Ed. 138 f. High School Course of Study—Social Studies (2).**

Content and organization of the materials of the social studies in the junior and the senior high school.

**Ed. 139 f or s. Supervised Teaching of High School Subjects (2).**

Observation and supervised teaching. Minimum of 20 periods. Staff.

**D. Home Economics Education**

**COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**H. E. Ed. 105 f or s. Special Problems, Child Study (4).** McNaughton.

**COURSES FOR GRADUATES**

**H. E. Ed. 201 f or s. Advanced Methods of Teaching Home Economics (2-4).**  
Study of social trends as applied to the teaching of home economics.

McNaughton.

**H. E. Ed. 250 y. Seminar in Home Economics Education (2-4).** (See Ed. 250 y.)  
McNaughton.

**E. Industrial Education**

No courses are offered at College Park in 1939-1940.

For courses offered in Baltimore, consult the "Department of Industrial Education Announcement of Baltimore Education Courses" issued in August, 1939. Address Professor Glen D. Brown, Department of Industrial Education, University of Maryland, Lombard and Greene Streets, Baltimore, Maryland.

**F. Physical Education**

**COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES**

**Ed. 142 f. Physical Education in the High School (2).** Prerequisites, Psych. 10 f and Ed. 5 s.

Objectives of physical education in high school situations; materials and procedures in relation to lesson planning, handling classes, physical examinations, discipline, records, grading, program, and the like.

**Ed. 143 f. Methods in Recreation (2).**

Major functions of recreation; selection and organization of subject matter; methods of instruction; planning, directing, and supervising projects for worthwhile achievements will be considered.

**Ed. 145 s. Teaching Health (2).** Prerequisites, Phys. Ed. 11 f, 13 f, 16 s.  
This course surveys the materials and methods for teaching health.



## COURSES FOR GRADUATES

**Phys. Ed. 201 f or s. Administration of Health and Physical Education (3).**

This course is designed to aid in solving problems incident to the administration of health and physical education in public schools. An attempt is made to set up standards for evaluating the effectiveness of programs of health and physical education. Mackert.

## ENGLISH LANGUAGE AND LITERATURE

## Special Departmental Requirements for Degrees

## MASTER OF ARTS

1. Candidates for the degree of Master of Arts in the Department of English must demonstrate a reading knowledge of French or German at the time of admission, or not later than six months before taking the degree.

2. In the thesis the candidate will be expected to demonstrate his ability to use the ordinary method of research in the discovery of knowledge and to organize and present his findings in a clear, effective English style.

3. The final examination will be based in part upon the courses pursued and in part upon first-hand knowledge of all the literary works included in the departmental list of reading for the Master's degree. The examination will test the candidate's powers of analysis and criticism.

4. Major work may be done in any of the five following fields, the required courses for which follow:

a. General major in English and American literature (designed chiefly for teachers in high schools): Old English, and a total of six hours from the following groups: (1) Elizabethan Drama or an Elizabethan seminar, (2) Milton, (3) Literature of the Eighteenth century, either undergraduate or seminar, (4) Prose and Poetry of the Romantic Age or Seminar in the Romantic Period, (5) Contemporary American Prose and Poetry or Seminar in American Literature.

b. Major work in English literature: Old English, and at least six hours from seminar courses in Medieval Romance, the Elizabethan Period, the Eighteenth century, the Romantic Period, the Victorian Period, Beowulf.

c. Major work in American literature: the Seminar in American Literature, and at least six hours from the advanced undergraduate courses in American literature.

d. Major work in Drama: History of the Theatre, and at least six hours of the following: Introduction to Comparative Literature, Medieval Drama, Contemporary Drama, Elizabethan Drama, Modern Drama, American Drama, Ibsen, The Faust Legend, Spanish Drama.

e. Major work in Philology: Old English, Beowulf, Middle English, Gothic, and either Medieval Romance or Chaucer.

Minor work may also be elected in these fields, but no major and minor combination of (a) with either (b) or (c) will be permitted.

## DOCTOR OF PHILOSOPHY

1. The following courses are required of candidates for the doctorate:

- a. Three credit hours in Comparative Literature.
- b. Six credit hours in Old English, English 102 f and 103 s, plus four credit hours in an Old English Seminar.
- c. Four credit hours in Middle English Language and Gothic.

2. Candidates must pass a comprehensive written examination, preferably one year before they expect to be awarded degrees. This examination will include linguistics (morphology and phonology) and each of the major literary fields, specifically: (1) Old English, (2) Middle English, (3) the Drama, (4) the Sixteenth and Seventeenth Centuries, (5) the Eighteenth and Nineteenth Centuries.

3. Major work for the degree may be done in American literature or in English literature; minor work may be done in these fields and also in Drama and Philology.

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

Eng. 100 f and s. Advanced Composition (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s. Course complete in one semester, but may be taken a second semester for credit.

Theory and practice in the larger forms, the types to be varied each semester at the election of the class.

Eng. 101 s. History of the English Language (3)—Three lectures. Prerequisite, Eng. 14 f.

An historical survey of the English language; its nature, origin and development, with special stress upon structural and phonetic changes in English speech and upon the rules which govern modern usage.

Harman.

Eng. 102 f. Old English (3)—Three lectures. Prerequisite, Eng. 14 f.

A study of Old English grammar and literature. Lectures on the principles of phonetics and comparative philology.

Harman.

Eng. 103 s. Beowulf (3)—Three lectures. Prerequisite, Eng. 102 f.

A study of the Old English epic in the original. Stress on philology, syntax, versification.

Harman.

Eng. 104 f. Chaucer (3)—Three lectures. Prerequisite, Eng. 1 y and Eng. 2 f and 3 s.

A study of the *Canterbury Tales*, *Troilus and Criseyde*, and the principal minor poems, with lectures and readings on the social background of Chaucer's time.

Hale.

Eng. 105 f. Medieval Drama in England (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the development of medieval English drama from its beginning to 1540. Class discussion of significant plays, outside reading, reports.

Fitzhugh.

**Eng. 106 s. Elizabethan Drama (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the change in spirit and form of English drama from 1540 to 1640, as seen in the works of the important dramatists other than Shakespeare. Class discussion of significant plays, outside reading, reports.

Zeeveld.

**Eng. 107 s. Elizabethan Non-Dramatic Literature (3)**—Three lectures. Prerequisites, Eng. 2 f and 3 s. (Not given in 1939-1940.)

Survey of the non-dramatic poetry and prose from 1557 to 1600, with emphasis upon the sonnet cycle, the epic, and the beginnings of fiction.

Zeeveld.

**Eng. 108 f. Milton (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the poetry and the chief prose works.

Murphy.

**Eng. 109 f. Literature of the Seventeenth Century to 1660 (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the chief prose writers and of the Metaphysical and Cavalier traditions in poetry.

Murphy.

**Eng. 110 s. The Age of Dryden (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

This course emphasizes the relation of literature to the philosophical movements of the age.

Murphy.

**Eng. 111 f. Literature of the Eighteenth Century (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s. (Not given in 1939-1940.)

Readings in the period dominated by Defoe, Swift, Addison, Steele, and Pope.

Fitzhugh.

**Eng. 112 s. Literature of the Eighteenth Century (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s. (Not given in 1939-1940.)

A continuation of Eng. 111 f. Dr. Johnson and his circle; the rise of Romanticism; the Letter Writers.

Fitzhugh.

**Eng. 113 f. Prose and Poetry of the Romantic Age (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the development of the Romantic movement in England as exemplified by the prose and poetry of Wordsworth, Coleridge, Lamb, De Quincy, Landor, and others.

**Eng. 114 s. Prose and Poetry of the Romantic Age (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the later Romantic writers, including Byron, Shelley, Keats, Moore, Scott, and others.

Hale.

**Eng. 115 f. Scottish Poetry (2)**—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s. No knowledge of the Scottish dialect required.

Readings in the Scottish Chaucerians; Drummond of Hawthornden; song and ballad literature; poets of the vernacular revival: Ramsay, Ferguson, and Burns. Papers and reports. Fitzhugh.

**Eng 116 f, 117 s. Victorian Prose and Poetry (3, 3).** Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the chief English authors of the nineteenth century from the close of the Romantic Period.

**Eng. 118 s. Modern and Contemporary British Poets (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the chief English and Irish poets of the twentieth century.

Murphy.

**Eng. 120 f. The History and Development of the Novel in England (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the origin and development of the novel as a form in England from the beginning to the nineteenth century. Ide.

**Eng. 121 s. The History and Development of the Novel in England (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of the later development of the English novel in the nineteenth and early twentieth centuries. Ide.

**Eng. 123 f. Modern Drama (3)**—Three lectures, Prerequisites, Eng. 1 y and Eng. 2 f and 3 s. (Not given in 1939-1940.)

A survey of English drama during the two centuries from 1660 to 1860. Class discussion of significant plays, outside reading, reports. Fitzhugh.

**Eng. 124 s. Contemporary Drama (3)**—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 f and 3 s.

A study of significant European and American dramatists from Ibsen to O'Neill. Class discussion of significant plays, outside reading, reports.

Fitzhugh.

**Eng. 125 f. Emerson, Thoreau, and Whitman (3)**—Three lectures. Prerequisites, Eng. 7 f and 8 s.

A study of the major writings of Emerson, Thoreau, and Whitman, with emphasis on transcendentalism, idealism, and democracy. Warfel.

**Eng. 126 s. American Fiction (3)**—Three lectures. Prerequisites, Eng. 7 f and 8 s.

Historical and critical study of the short story and novel in the United States from 1789 to 1920. Warfel.

**Eng. 127 f. Contemporary American Poetry and Prose (3)**—Three lectures. Prerequisites, Eng. 7 f and 8 s. (Not given in 1939-1940.)

Tendencies and forms in non-dramatic literature since 1920.

Warfel.

**Eng. 128 s. American Drama (3)**—Three lectures. Prerequisites, Eng. 7 f and 8 s. (Not given in 1939-1940.)

Historical study of representative American plays and playwrights to 1920.  
Warfel.

#### COURSES FOR GRADUATES

**Eng. 201. Research (2-4)**—Credit proportioned to the amount of work and ends accomplished.

Original research and the preparation of dissertations looking towards advanced degrees.  
Staff.

**Eng. 203 f. Middle English Language (2)**—Two lectures. Prerequisites, Eng. 102 f and 103 s.

A study of readings of the Middle English period, with reference to etymology and syntax.  
Harman.

**Eng. 204 s. Gothic (2)**—Two lectures. Prerequisites, Eng. 102 f and 103 s.

A study of the forms and syntax, with readings from the Ulphilas Bible. Correlation of Gothic speech sounds with those of Old English.  
Harman.

**Eng. 206 f. Shakespeare Seminar (2)**—Two lectures. Prerequisites, Eng. 11 f and Eng. 12 s.

A survey of Shakespeare's complete works, with special attention to major problems in Shakespeare.  
Zeeveld.

**Eng. 207 y. Medieval Romance in England (4)**—Two lectures.

Lectures and readings in the cyclical and non-cyclical romances in Medieval England, and their sources, including translations from the Old French. Hale.

**Eng. 208 s. Seminar in Eighteenth Century Literature (2)**—Two lectures.

Intensive study of one man's work or of one important movement of the century.  
Fitzhugh.

**Eng. 209 y. Seminar in American Literature (4)**—Two lectures. The subject for 1939-1940 will be American Fiction to 1865.  
Warfel.

**Eng. 210 f. Seminar in the Romantic Period (2)**—Two lectures. Prerequisites, Eng. 113 f and 114 s, or an equivalent satisfactory to the instructor. One discussion period of two hours.

Special studies of problems or persons associated with the Romantic movement. The subject matter of the course will vary with the interests of the class.  
Hale.

**Eng. 211 y. Seminar in the Victorian Period (4)**—Two lectures.

Special studies of problems or persons in English literature from about 1830 to the end of the century.

#### ENTOMOLOGY

##### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Ent. 101 y. Economic Entomology (4)**—Two lectures. (Not offered in 1939-1940.)



An intensive study of the problems of applied entomology, including life history, ecology, behavior, distribution, parasitism, and control. Cory.

**Ent. 103 y. Seminar (2).**

Presentation of original work, book reviews, and abstracts of the more important literature. Cory, Knight.

**Ent. 104 f and s. Insect Pests of Special Groups (6)**—Two lectures; one laboratory. Prerequisite, Ent. 1 f or s.

A study of the principal insect pests of one or more of the following groups, founded upon food preferences and habitat. The course is intended to give the general student a comprehensive view of the insects that are of importance in his major field of interest, and detailed information to the student specializing in entomology.

Insect Pests of: 1, Fruit; 2, Vegetables; 3, Flowers, both in the open and under glass; 4, Ornamental and shade trees; 5, Forests; 6, Field crops; 7, Stored products; 8, Live stock; 9, The household. Cory.

**Ent. 105 f. Medical Entomology (2)**—Two lectures. Prerequisite, Ent. 1 f or s, and consent of instructor.

The relation of insects to diseases of man, directly and as carriers of pathogenic organisms. Control of pests of man. The fundamentals of parasitology. Knight.

**Ent. 106 s. Insect Taxonomy (3)**—Two lectures; one laboratory.

An advanced course dealing with the principles and practices underlying modern systematic entomology. Hyslop.

**Ent. 107 s. Theory of Insecticides (2)**—Two lectures.

The development and use of contact and stomach poisons, with regard to their chemistry, toxic action, compatibility, and foliage injury. Recent work with insecticides will be especially emphasized. Ditman.

**Ent. 109 s. Insect Physiology (2)**—Two lectures; occasional demonstrations. Enrollment subject to consent of instructor.

The functioning of the insect body with particular reference to blood, circulation, digestion, absorption, respiration, reflex action and the nervous system, metabolism, and excretion. Yeager.

**Ent. 110 f or s. Special Problems.** Credit and prerequisite to be determined by the staff.

The intensive investigation of some entomological subject. Cory and Staff.

**Ent. 111 s. Coccidology (2)**—Two laboratories.

A study of morphology, taxonomy, and biology of the higher groups of the scale insects. The technique of preparation and microscopy are emphasized. Laboratory studies are supplemented by occasional lectures. McConnell.

#### COURSES FOR GRADUATES

**Ent. 201. Advanced Entomology (1-3).**

Studies of minor problems in morphology, taxonomy, and applied entomology, with particular reference to preparation for individual research. Cory.

**Ent. 202. Research in Entomology.**

Advanced students having sufficient preparation, with approval of the head of the department, may undertake supervised research in morphology, taxonomy, or biology and control of insects. Frequently the students may be allowed to work on Station or State Horticultural Department projects. The student's work may form a part of the final report on the project and be published in bulletin form. A dissertation, suitable for publication, must be submitted at the close of the studies as a part of the requirements for an advanced degree.

Cory and Staff.

**Ent. 203 f. Insect Morphology (2-4)**—Two lectures, and laboratory work by special arrangement, to suit individual needs.

Insect anatomy with special relation to function. Given particularly in preparation for work in physiology and other advanced studies. Snodgrass.

**Ent. 204 y. Economic Entomology (6)**—Three lectures.

Studies of the principles underlying applied entomology, and the most significant advances in all phases of entomology.

Cory.

**Ent. 205 s. Insect Ecology (2)**—One lecture; one laboratory.

A study of the fundamental factors involved in the relationship of insects to their environment. Emphasis is placed on the insect as a dynamic organism adjusted to the environment.

Langford.

**GENETICS****COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES****Gen. 101 f. Genetics (3)**—Three lectures.

A general course designed to give an insight into the principles of genetics, or of heredity, and also to prepare students for later courses in the breeding of animals or of plants.

Kemp.

**Gen. 102 s. Advanced Genetics (2)**—Two lectures. Prerequisite, Gen. 101 f.

A consideration of chromosome irregularities and other mutations, interspecies crosses, identity and nature of the gene, genetic equilibrium, statistical significance of genetic phenomena.

Kemp.

**COURSES FOR GRADUATES****Gen. 201. Plant Breeding**—Credit according to work done.

Kemp.

**HISTORY****COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES****H. 101 y. American Colonial History (6)**—Three lectures. Prerequisite, H. 2 y.

A study of the political, social, and economic development of the American people from the discovery of America through the formation of the Constitution.

Baker-Crothers.

**H. 102 y. Recent American History (6)**—Three lectures. Prerequisite, H. 2 y.

The history of national development from the close of the Civil War to the present time. Thatcher.

**H. 104 f. Social and Economic History of the United States (3)**—Three lectures. Prerequisite, H. 2 y.

An advanced course giving a synthesis of American life from 1607 to 1790. Baker-Crothers.

**H. 105 s. Social and Economic History of the United States (3)**—Three lectures. Prerequisite, H. 2 y.

This course is similar to H. 104 f, and covers the period from 1790 to 1860. Baker-Crothers.

**H. 106 f, 107 s. Diplomatic History of the United States. (2-2).**—Two lectures. Prerequisite, H. 2 y.

A study of American foreign policy. Thatcher.

**H. 108 f, 109 s. Constitutional History of the United States (3-3)**—Three lectures. Prerequisite, H. 2 y.

A study of the historical forces resulting in the formation of the Constitution and of the development of American constitutionalism in theory and practice thereafter. Thatcher.

**H. 110 f, 111 s. History of the United States, 1789-1865 (2-2)**—Two lectures. Prerequisite, H. 2 y.

The history of national development to the end of the Civil War. Thatcher.

**H. 112 f, 113 s. History of Maryland (2-2)**—Two lectures. Prerequisite, H. 2 y.

A survey of the political, economic and social progress of Maryland as colony and state. Dozer.

**H. 115 f. Medieval History (2)**—Two lectures. Prerequisite, H. 1 y.

A brief survey of the medieval period with special emphasis on the legacy of the Middle Ages. Prange.

**H. 117 s. Renaissance and Reformation (2)**—Two lectures. Prerequisite, H. 1 y.

A brief survey of the Renaissance and Reformation. Prange.

**H. 119 f. Seventeenth and Eighteenth Century Europe (2)**—Two lectures. Prerequisite, H. 1 y or H. 3 y.

A study of the political, economic, social and intellectual ferment of the "Age of Reason." Silver.

**H. 120 s. Revolutionary and Napoleonic Europe (2)**—Two lectures. Prerequisite, H. 1 y or H. 3 y.

A study of the French Revolution and the relation of Revolutionary France with the rest of Europe, 1789-1815. Silver.

**H. 121 f, 122 s. Expansion of Europe (3-3)**—Three lectures. Prerequisite, H. 1 y.

A treatment of European history from the Crusades to the present, emphasizing especially the expansion of national states. Silver.

**H. 123 f, 124 s. Diplomatic History of Europe since 1871 (3-3)**—Three lectures. Prerequisite, H. 1 y.

A study of European alliances and alignments. World politics and imperialism in the pre-World War period, and developments since the World War. Strakhovsky.

**H. 125 f, 126 s. Constitutional History of England (3-3)**—Three lectures. Prerequisite, H. 1 y or H. 3 y.

This course traces the historical development of English political institutions. Silver.

**H. 127 f. Europe, 1815-1914 (3)**—Three lectures and assignments. Prerequisite, H. 1 y. (Not given in 1939-1940.)

An intensive course in European history from 1815 to the present time. Strakhovsky.

**H. 128 s. Present Day Europe (3)**—Three lectures and assignments. Prerequisite, H. 1 y. (Not given in 1939-1940.)

Continuation of H. 127. Strakhovsky.

**H. 129 f, 130 s. Ancient History (2, 2)**—Two lectures.

A general summary course—The Near East, Greece, and Rome. Highby.

**H. 131 f, 132 s. Latin American History (2, 2)**—Two lectures. Prerequisite, H. 1 y or H. 2 y.

A survey of the history of the Latin American states from the wars of independence to the present with special emphasis upon Argentine, Brazil, Chile, and Mexico, and their relations with the United States. Dozer.

#### COURSES FOR GRADUATES

**H. 200. Research (2-4).** Credit proportioned to the amount of work.

Staff.

**H. 201 y. Seminar in American History (4)**—Conferences and reports on related topics. Baker-Crothers.

**H. 202 f. Historical Bibliography (2).**

Staff.

**H. 203 s. Historical Criticism (2).**

Staff.

**H. 204 y. Seminar in European History (4).**

Strakhovsky.

#### HOME ECONOMICS

##### Foods and Nutrition

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**H. E. 131 f. Nutrition (3)**—Three recitations. Prerequisites, H. E. 31 y and Elements of Organic Chemistry (Chem. 12 A y).

A scientific study of principles of human nutrition.

Welsh.

**H. E. 132 s. Dietetics (3)**—Two recitations; one laboratory. Prerequisite, H. E. 131 f.

A study of food selection for health; planning and calculating dietaries for adults and children.

**H. E. 133 f and s. Demonstrations (2)**—Two laboratories.

Practice in demonstrations.

Welsh and Barnes.

**H. E. 134 f and s. Advanced Foods (3)**—One recitation; two laboratories. Prerequisite, H. E. 31 y.

Advanced study of manipulation of food material.

Welsh.

**H. E. 135 f and s. Experimental Foods (4)**—Two recitations; two laboratories. Prerequisites, H. E. 31 y, H. E. 137 s, Chem. 12 A. y.

Study of experimental procedures and technics in jelly making, vegetable cookery, emulsions, and batters and doughs.

Kirkpatrick.

**H. E. 136 s. Child Nutrition (2)**—Two recitations.

Lectures, discussions and field trips relating to the principles of child nutrition.

Welsh.

**H. E. 137 f and s. Food Buying and Meal Service (3)**—One recitation; two laboratories. Prerequisite H. E. 31 y.

Study of problems in food buying; planning and service of meals for the family group, including simple entertaining in relation to nutritional needs and cost.

**H. E. 138 s. Diet in Disease (3)**—One recitation; two laboratories. Prerequisite, H. E. 131 f.

Modification of the principles of human nutrition to meet dietary needs of certain diseases.

#### COURSES FOR GRADUATES

**H. E. 201 f or s. Seminar in Nutrition (2).**

Oral and written reports on current literature of nutrition.

Staff.

**H. E. 202. Research.** Credits to be determined by amount and quality of work done.

With the approval of the head of the department, students may pursue an original investigation in some phase of foods. The results may form the basis of a thesis for an advanced degree.

Welsh.

**H. E. 203 f or s. Advanced Experimental Foods (3)**—One recitation; two laboratories.

Kirkpatrick.

**H. E. 204 f. Readings in Nutrition (2).**

Reports and discussions of outstanding nutritional research and investigations.

Staff.



**H. E. 205 f or s. Nutrition (3)**—One recitation; laboratory by arrangement.

Feeding experiments are conducted on laboratory animals to show effects of diets of varying compositions.

### Textiles and Clothing

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**H. E. 112 s. Special Clothing Problems (3)**—Three laboratories. Prerequisite, H. E. 11 f.

Clothing renovation, clothing for children, and an individual clothing project. Kessinger.

**H. E. 171 s. Advanced Textiles (3)**—One recitation; two laboratories. Prerequisite, H. E. 71 f.

The study of the production of textile fibers; the manufacture of fabrics and their relationship to the consumer; textile microscopy; reports on assigned readings in current literature on textiles. Kessinger.

**H. E. 172 f. Special Textile Problems (4)**—One recitation; three laboratories. Prerequisite, H. E. 171 f.

Testing and experimental work in textiles. Kessinger.

### Practical Art

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**H. E. 121 f, 122 s. Interior Decoration (3, 3)**—One recitation, two laboratories. Prerequisite, H. E. 21 s or equivalent.

Study of traditional styles and design principles with relation to personalities in home planning and furnishing; trips to historic buildings; special merchandise lectures showing what the market provides. Minimum of drawing. Curtiss.

**H. E. 123 f. Advanced Design (3)**—Three laboratories. Prerequisite, H. E. 122 and H. E. 111 f, or equivalent.

Professional aspects of costume or interior design; contact with commercial establishments. Design expressed in various mediums. Students may choose one of the two fields listed as follows:

- (a) **Advanced Costume Design**—Designing of costumes on paper and in cloth; a study of garment merchandising including fashion illustration, shop display, and other phases of promotional work.
- (b) **Interior Design**—Designing of rooms, including interior architecture, furniture, fabrics, accessories; arrangement of display rooms in stores. Drawing to scale. Curtiss.

**H. E. 124 s. Advanced Design (3)**—Three laboratories.

**H. E. 125 s. Merchandise Display (2)**—Two laboratories.

Practice in effective display of merchandise for windows, show cases, and other parts of store interiors. Cooperation with retail establishments. Prerequisite, Design H. E. 21 s or equivalent. Curtiss.

## HORTICULTURE

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Hort. 101 f. Technology of Horticultural Plants (1, 3, or 5)**—One, three or five lectures.

A critical analysis of detailed studies on horticultural plants in relation to application to practice. An interpretation of horticultural knowledge, based on principles of physiology, chemistry, and other sciences. A study of underlying principles involved in growth, fruiting, storage and quality of horticultural plants and products.

Haut, Mahoney.

**Hort. 102 s. Technology of Horticultural Plants (2 or 4).** Two or four lectures. Continuation of Hort. 101 f.

Haut, Mahoney.

**Hort. 103 f. Systematic Pomology (3)**—Two lectures; one laboratory. (Given in alternate years; not offered in 1939-1940.)

The history, botany, and classification of fruits and their adaptation to Maryland conditions.

Haut.

**Hort. 104 s. Systematic Olericulture (3)**—Two lectures; one laboratory. (Given in alternate years; not offered in 1939-1940.)

A study of the classification and nomenclature of vegetable crops and the description and identification of varieties. The adaptation of varieties to different environmental conditions and their special uses in vegetable production.

Mahoney.

**Hort. 105 s. World Fruits and Nuts (2)**—Two lectures. (Given in alternate years.)

A study of the botanical, ecological, and physiological characteristics of all species of fruit-bearing plants of economic importance, such as the date, pineapple, fig, olive, banana, nut-bearing trees, citrus fruits, and newly introduced fruits with special reference to their cultural requirements in certain parts of the United States and the insular possessions. All fruits are discussed in this course which have not been discussed in a previous course.

Haut.

**Hort. 106 y. Plant Materials (5)**—One lecture; one or two laboratories. (Given in alternate years).

A field and laboratory study of trees, shrubs, and vines used in ornamental planting.

Thurston.

## COURSES FOR GRADUATES

**Hort. 201 y. Experimental Pomology (6)**—Three lectures.

A systematic study of the sources of knowledge and opinion as to practices in pomology; methods and difficulties in experimental work in pomology and results of experiments that have been or are being conducted in all experiment stations in this and other countries.

Schrader.

**Hort. 202 y. Experimental Olericulture (6)**—Three lectures.

A systematic study of the sources of knowledge and opinion as to practices in vegetable growing; methods and difficulties in experimental work in

vegetable production and results of experiments that have been or are being conducted in all experiment stations in this and other countries. Mahoney.

**Hort. 204 s. Methods of Research (2)**—One lecture; one laboratory.

Special drill will be given in the making of briefs and outlines of research problems, in methods of procedure in conducting investigational work, and in the preparation of bulletins and reports. A study of the origin, development, and growth of horticultural research is taken up. A study of the research problems being conducted by the Department of Horticulture will be made, and students will be required to take notes on some of the experimental work in the field. Staff.

**Hort. 205. Research (4, 6 or 8).**

Graduate students will be required to select problems for original research in pomology or vegetable gardening. Final results will be published in the form of a thesis. Staff.

**Hort. 206 y. Advanced Horticultural Seminar (2).**

Required of all graduate students. Students will give reports either on special topics assigned them, or on the progress of their work in courses. Members of the departmental staff will report special research work from time to time. Staff.

## MATHEMATICS

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Math. 111 f. Elementary Mathematics from an Advanced Standpoint (2).** Two lectures.

A survey of pre-collegiate mathematics intended for workers in the biological and social sciences; also, for prospective teachers of mathematics and physics.

**Math. 112 s. College Mathematics (2)**—Two lectures. Prerequisite, Math. 111 f or 8 f, or equivalent courses.

A survey course of algebra, trigonometry, analytic geometry, and the calculus, intended for workers in the biological sciences and for prospective teachers of mathematics and physics. Dantzig.

**Math. 114 f. Differential Equations for Engineers (3)**—Three lectures.

This course is conducted in close cooperation with the College of Engineering, and deals with aspects of mathematics which arise in engineering theory and practice. Among the topics treated are the following: linear differential equations; advanced methods in kinematics and dynamics; applications of analysis to electrical circuits, aero-dynamics, bridge-design, etc. Dantzig, Yates.

**Math. 115 s. Applied Calculus for Chemists (3)**—Three lectures. Prerequisite, Math. 16 y.

This course is conducted in close co-operation with the Chemistry Department, and deals with the aspects of mathematics which arise in the theory and practice of chemistry. Among the topics treated are the following: partial and total derivatives, applications of mathematical analysis to thermo-dynamics, to molecular and atomic phenomena, and to physical chemistry, Yates.

**Math. 116 f. Advanced Trigonometry (2).** Two lectures. Prerequisite, Math. 23 y or its equivalent.

Complex numbers; DeMoivre, Euler and allied identities; trigonometric series and products; periodic functions; trigonometric solution of equations; hyperbolic functions; spherical trigonometry.

**Math. 122 s. History of Elementary Mathematics (2)**—Two lectures.

History of arithmetic, algebra and geometry. Dantzig.

**Math. 131 s. Analytical Mechanics (2)**—Two lectures. Prerequisite, Math. 23 y.

Kinematics; the dynamics of a particle; statics; the principles of D'Alembert; the dynamics of a system; the equations of Lagrange and Jacobi; the principle of Hamilton. Yates.

**Math. 132 f. Theory of Probabilities (2)**—Two lectures. Prerequisite, Math. 23 y.

Frequency and probability; the concept of "equally likely"; combinatorial analysis; addition and multiplication theorems; frequency of distribution; continuous probabilities; applications to statistics, theories of errors and correlations, and to molecular theories. Titt.

**Math. 140 y. Undergraduate Seminar (2)**—One session.

Required of students who major in mathematics. This course is intended as a clearing house of problems which arise in the undergraduate courses in mathematics. Dantzig, Yates, Titt, Lancaster.

**Math. 141 f. Higher Algebra (2)**—Two lectures. Prerequisite, Math. 23 y.

Identities. Multinomial expansion. Combinatorial analysis. Mathematical induction. Undetermined coefficients. Determinants. Elementary theory of equations. Complex magnitudes. Yates.

**Math. 142 s. Higher Algebra (2)**—Two lectures. Prerequisite, Math. 141 f or its equivalent.

Inequalities. Continued fractions. Summation of series. Difference equations. Theory of numbers. Diophantine equations. Yates.

**Math. 143 f. Advanced Calculus (2)**—Two lectures. Prerequisite, Math. 23 y or its equivalent.

General methods of integration. Multiple integration with physical applications. Partial differentiation. Geometrical and physical applications. Mean value theorem. Jacobians. Envelopes. Martin.

**Math. 144 s. Advanced Calculus (2)**—Two lectures. Prerequisite, Math. 143 s or its equivalent.

Elliptic integrals. Line integrals. Green's theorem. Equation of continuity. Applications to hydrodynamics. Martin.

**Math. 145 f. Advanced Plane Analytic Geometry (2)**—Two lectures. Prerequisite, Math. 23 y.

Homogeneous coordinates. Advanced theory of conic sections. Plucker characters of algebraic curves. Cubic and quartic curves. Cremona transformations. Dantzig.

**Math. 146 s. Solid Analytic Geometry (2)**—Two lectures. Prerequisite, Math. 145 f or its equivalent.

General theory of quadric surfaces. The twisted cubic. Line geometry. Geometry on a sphere. Cubic and quartic surfaces. Alrich.

**Math. 151 f. Theory of Equations (2)**—Two lectures. Prerequisite, 142 s or its equivalent.

Complex number. Fundamental theorem of algebra. Equations of the third and fourth degree. Algebraic solution of equations. Finite groups. Numerical solution of equations. Criteria of irreducibility. Cyclometric equations.

Lancaster.

**Math. 152 s. Introduction to Modern Algebra (2)**—Two lectures. Prerequisite, Math. 141 f and 142 s or their equivalents.

Vectors. Matrices. Linear dependence. Quadratic forms. Infinite groups. Titt.

**Math. 153 f. Differential Equations (2)**—Two lectures. Prerequisite, Math. 144 s or its equivalent.

Equation of the first order. Linear equations with constant and variable coefficients. Change of variables. Singular solutions. Solution in series. Numerical integration. Ordinary differential equations in three variables. Partial differential equations. Lancaster.

**Math. 154 s. Topics in Analysis (2)**—Two lectures. Prerequisite, Math. 153 f.

Theory of vibrations. Fourier series. Calculus of variations. Entropy. Improper integrals. Titt.

**Math. 155 f. Introduction to Projective Geometry (2)**—Two lectures. Prerequisite, Math. 145 f or its equivalent.

The theorems of Desargues and Pappus. Cross-ratio and homography. Projective theory of conics. Projective interpretation and generalization of elementary geometry. Dantzig.

**Math. 156 s. Introduction to Differential Geometry (2)**—Two lectures. Prerequisite Math. 23 y.

Infinitesimal properties of plane curves. Transformation. Orthogonal trajectories. Envelopes. Roulettes and Glisettes. Curvilinear coordinates in the plane. Dantzig.

**Math. 157 s. History of Modern Mathematics (2)**—Two lectures. Prerequisite, Math. 23 y or its equivalent.

This course will begin with a comprehensive treatment of the history of mathematics during the seventeenth and eighteenth centuries. The development of mathematics during the nineteenth and our own centuries will be treated topically, with special emphasis on such topics as projective and non-Euclidean geometry, theory of aggregates, vector analysis, theory of groups, theory of numbers, etc. Dantzig.



COURSES FOR GRADUATES

**Math. 221 f. Theory of Functions of a Complex Variable (2)**—Two lectures. Prerequisites, Math. 143 f and 144 s or their equivalent.

Cauchy-Riemann equations; power series and infinite products; conformal mapping; the Cauchy integral theorem; residues and periods; analytic continuation. Martin.

**Math. 222 f. Theory of Functions of a Real Variable (2)**—Two lectures. Prerequisites, Math. 143 f and 144 s, or their equivalent.

Real numbers; continuous functions; implicit functions; Riemannian integration; real analytic functions. Martin.

**Math. 223 s. Vector Analysis (2)**—Two lectures. Prerequisite, Math. 152 s, or its equivalent.

Scalars, vectors, matrices and determinants; transformations; linear dependence, canonical forms; elementary divisors; applications to geometry and mechanics. Alrich.

**Math. 225 f. Projective Geometry (2)**—Two lectures. Prerequisite Math. 155 f, or its equivalent.

Axiomatic development of geometry. Fundamental theorem. Projective equivalence. The group of collineations in the plane and in space. Non-Euclidean geometries. Dantzig.

**Math. 226 s. Differential Geometry (2)**—Two lectures. Prerequisite, Math. 156 s, or its equivalent.

Principles of Vector analysis. Skew curves. Kinematical applications. Geometry on a surface. General theory of surfaces. Curvature and space structure. Riemannian geometries. Dantzig.

**Math. 227 s. Infinite Processes (2)**—Two lectures. Prerequisite, Math. 222 f, or its equivalent.

Convergence of infinite series and products; Fourier series; orthogonal functions; asymptotic series. Lancaster.

**Math. 228 s. Elliptic Functions (2)**—Two lectures. Prerequisite, Math. 222 f, or its equivalent.

The theories of Legendre and Jacobi; the Weierstrass theory; doubly periodic functions; elliptic integrals; applications to algebra, geometry, and mechanics. Martin.

**Math. 231 s. Partial Differential Equations with Applications to Mathematical Physics (2)**—Two lectures. Prerequisites, Math. 143 f, Math. 144 s, and Math. 153 f, or their equivalent.

Partial differential equations of the first and second order; linear equations; total differential equations; equations of the Monge-Ampere type; the Laplace equation; harmonics; applications to electricity, heat, elasticity, and hydrodynamics; potential theory. Titt.

**Math. 235 s. Modern Algebra (2)**—Two lectures. Prerequisite, Math. 152 s, or its equivalent.

Sets, classes, groups, isomorphism, rings, fields, Galois theory, ordered and well-ordered sets, ideals, linear algebras. Dantzig.

**Math. 240 y. Graduate Seminar (2)**—One session.

Required of all graduate students. Intended as a clearing house of problems arising in the graduate courses. Reports on progress on dissertations and a critical discussion of results achieved.

Dantzig, Yates, Martin, Titt, Alrich, Lancaster.

### Selected Topics Courses

In addition to the preceding, a number of courses will be offered from time to time by the various members of the staff in their respective fields of specialization. These courses are intended primarily for candidates for advanced degrees, and aim at developing materials for dissertations; however, they will be open to any qualified student.

Selected Topics in Modern Geometry.	Dantzig, Alrich.
Selected Topics in Modern Analysis.	Martin, Lancaster.
Selected Topics in Dynamics.	Martin.
Selected Topics in Mathematical Physics.	Titt.
Selected Topics in Applied Mathematics.	Yates.

## MODERN LANGUAGES

### A. French

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**French 102 y. French Literature of the Seventeenth Century (4)**—Two lectures. (Not given in 1939-1940.) Wilcox.

**French 103 y. French Literature of the Eighteenth Century (4)**—Two lectures. Falls.

**French 104 y. French Literature of the Nineteenth Century (4)**—Two lectures. Wilcox.

**French 105 y. French Literature of the Twentieth Century (4)**—Two lectures. (Not given in 1939-1940.) Falls.

**French 110 y. Advanced Composition (6)**—Three lectures. Prerequisite, French 10 y. Falls.

Attention is also called to Comparative Literature 105 f, Romanticism in France.

#### COURSES FOR GRADUATES

**French 201. Research.** Credits determined by work accomplished.

**French 202 y. Diderot and the Encyclopaedists (4)**—Two lectures. (Not given in 1939-1940.) Falls.

**French 204 y.** Georges Duhamel, Poet, Dramatist, Novelist (4)—Two lectures. (Not given in 1939-1940.) Falls.

**French 205 y.** French Literature of the Middle Ages and the Renaissance (4)—Two lectures. (Not given in 1939-1940.) Darby.

**French 206 f, 207 s.** The French Novel in the First Half of the Nineteenth Century. (2, 2)—Two lectures. Falls.

**French 208 f, 209 s.** The French Novel in the Second Half of the Nineteenth Century (2, 2)—Two lectures. (Not given in 1939-1940.) Falls.

**French 210 y.** Seminar (2-4)—One meeting weekly. Required of all graduate students in French.

**French 212 s.** Introduction to Old French (2)—Two lectures. Darby.

**French 220 f, 221 s.** Reading Course (2, 2)—One conference.

Designed to give graduate students the background of a survey of French literature. Extensive outside reading with reports and connecting lectures. Falls.

## B. German

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**German 101 f.** German Literature of the Eighteenth Century (3)—Three lectures. (Not given in 1939-1940.)  
The earlier classical literature. Prahl.

**German 102 s.** German Literature of the Eighteenth Century (3)—Three lectures. (Not given in 1939-1940.)  
The later classical literature. Prahl.

**German 103 f.** German Literature of the Nineteenth Century (3)—Three lectures.  
Romanticism in Young Germany. Prahl.

**German 104 s.** German Literature of the Nineteenth Century (3)—Three lectures.  
The literature of the Empire. Prahl.

**German 105 f, 106 s.** Contemporary German Literature (3, 3)—Three lectures.  
A study of the lives, works, and influence of outstanding authors of the present. Prahl.

Attention is called to Comparative Literature 106 s, Romanticism in Germany, and Comparative Literature 107 f, The Faust Legend in English and German Literature.

## COURSES FOR GRADUATES

**German 201. Research.** Credits determined by work accomplished.

**German 202 y. The Modern German Drama (4)**—Two lectures.

Study of the naturalistic, neo-romantic, and expressionistic drama against the background of Ibsen and other international figures. Prah. l.

**German 203 y. Schiller (4)**—Two lectures. (Not given in 1939-1940.)

Study of the life and works of Schiller with special emphasis on the history of his dramas. Prah. l.

**German 204 f. Goethe's Faust (2)**—Two lectures.

Zucker.

**German 205 s. Goethe's Works outside of Faust (2)**—Two lectures.

Zucker.

**German 206 y. The Romantic Movement (2)**—Two lectures.

Prah. l.

**German 210 y. Seminar (2-4)**—Two meetings weekly. Required of all graduate students in German.

**German 220 f, 221 s. Reading Course (2, 2)**—One conference.

Designed to give graduate students the background of a survey of German literature. Extensive outside reading with reports and connecting lectures. Prah. l.

## C. Spanish

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Spanish 103 f. The Spanish Drama (3)**—Three lectures.

The drama of the Golden Age.

Darby.

**Spanish 104 s. The Spanish Drama (3)**—Three lectures.

Continuation of Spanish 103 f. The drama since Calderon.

Darby.

**Spanish 105 y. Cervantes (6)**—Three lectures. (Not given in 1939-1940.)

The life and times of Cervantes; principal prose works.

Darby.

**Spanish 107 f. The Spanish Novel (3)**—Three lectures.

Classic novels and short stories of the Golden Age and of the eighteenth century. (Not given in 1939-1940.)

Darby.

**Spanish 108 s. The Spanish Novel (3)**—Three lectures.

Continuation of Spanish 107 f. A study of the development of the modern novel. (Not given in 1939-1940.)

Darby.

## COURSES FOR GRADUATES

**Spanish 201. Research (2-4)**—Credits determined by work accomplished.

Staff.

**Spanish 202 y. The Golden Age in Spanish Literature (6)**—Three lectures. Detailed study of the classical authors. Darby.

**Spanish 203 f. Spanish Poetry (3)**—Three lectures. (Not given in 1939-1940.) The epic, the ballad and popular poetry, early lyrics, poetry of the Golden Age. Darby.

**Spanish 204 s. Spanish Poetry (3)**—Three lectures. (Not given in 1939-1940.) Continuation of Spanish 203 f. Poetry of the eighteenth, nineteenth, and twentieth centuries. Darby.

**Spanish 210 y. Seminar (2-4)**—One meeting weekly. Required of all graduate students in Spanish.

**Spanish 212 f. Introduction to Old Spanish (2)**—Two lectures. Darby.

**Spanish 220 f, 221 s. Reading Course (2, 2)**—One conference.

Designed to give graduate students the background of a survey of Spanish literature. Extensive outside reading with reports and connecting lectures. Darby.

## PHILOSOPHY

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Phil. 101 f, 102 s. Systems of Philosophy (3, 3)**—Three hours. Lectures, reports and discussions. Prerequisite, two courses in philosophy, and the permission of the instructor. (Not given in 1939-1940.)

The system of one philosopher, or the development of one movement, will be studied throughout each semester. The topic will be changed from semester to semester, although after three or four semesters the same system may be chosen again. Marti.

**Phil. 103 f, 104 s. Systems of Philosophy (3, 3)**—Three hours of lectures, student reports, and discussion. Prerequisite, two courses in philosophy and the permission of the instructor. Continuation of Phil. 101 f. Topics of study to be announced. Marti.

## PHYSICS

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Phys. 101 f. Precision of Measurements (3)**—Three lectures. Prerequisites, Phys. 2 y, or Phys. 1 y and Math. 23 y.

A discussion of the principles underlying the treatment of experimental data, as to precision of observations, errors, interpolation, curve analysis, etc., with special emphasis on the planning of investigations involving measurements. The course is intended as an introduction to quantitative experimental work. Eichlin.

**Phys. 102 s. Physical Measurements (3)**—Two lectures; one laboratory. Prerequisite, Phys. 101 f.



This course, supplementing Phys. 101 f, is designed to familiarize the student with the manipulation of various types of apparatus used in experimentation in physical problems, and the adaptation and analysis of data so obtained. Eichlin.

**Phys. 103 y. Advanced Physics (6)**—Three lectures. Prerequisite, Phys. 1 y.

This course, supplementing Phys. 1 y, is an advanced study of physical phenomena in optics, spectroscopy, conduction of electricity through gases, photoelectricity, etc., with a comprehensive review of basic principles involved. It is intended to familiarize the student in a general survey with some of the recent developments in physics. Smith.

**Phys. 104 y. Advanced Experiments (6)**—One lecture; two laboratories. Prerequisite, Phys. 103 y. (Not given in 1939-1940.)

This course, supplementing Phys. 1 y, is intended to provide the student with experience in experimental physics.

**Phys. 105 f. Heat (3)**—Two lectures; one laboratory. Prerequisite, Phys. 2 y, or Phys. 1 y and Math. 23 y.

The classical phenomena of heat and radiation are developed on the basis of the kinetic molecular theory and the quantum theory. The first and second laws of thermodynamics are applied to physical processes. Myers.

**Phys. 106 s. Theoretical Mechanics (3)**—Three lectures. Prerequisite, Phys. 2 y, or Phys. 1 y and Math 23 y.

An analytical treatment of the fundamental principles of kinematics and dynamics is presented with problems to illustrate these principles. The use of generalized coordinates is illustrated. The equations of Lagrange are applied to selected topics in the field of dynamics. Myers.

**Phys. 107 f. Optics (3)**—Two lectures; one laboratory. Prerequisite, Phys. 2 y, or Phys. 1 y and Math. 23 y.

A study is made of selected topics in the refraction, reflection, interference, diffraction and polarization of light. The principles are employed in a detailed study of optical systems of telescope, microscope, spectroscope and interferometer. Dickinson.

**Phys. 108 y. Electricity (6)**—Two lectures; one laboratory. Prerequisite, Phys. 2 y, or Phys. 1 y, and Math. 23 y.

A study of electrical properties of matter and space with applications to common electrical instruments and apparatus. Dickinson.

**Phys. 109 y. Electron Physics (6)**—Two lectures; one laboratory.

The discrete nature of matter, electricity and radiation is emphasized from an empirical point of view. The determination of the fundamental electronic and molecular constants is treated in detail. The process of electrical discharge through gas and vacuum is ramified to include discussion of radioactivity, photoelectricity, thermionics and atomic structure. Myers.

**Phys. 110 s. Sound (3)**—Two lectures; one laboratory. Prerequisite, Phys. 2 y, or Phys. 1 y and Math 23 y. (Not given in 1939-1940.)

A study is made of vibrating systems, the propagation and scattering of sound waves, standing sound waves, sound wave energy, etc.

**Phys. 111 f, 112 s. Mathematical Physics (3, 3)**—Three lectures. Prerequisite, Phys. 2 y, or Phys. 1 y and Math 23 y.

Selected topics in physics will be treated to illustrate certain mathematical methods, particularly the use of derivatives and differentials, methods of integration, infinite series, vectors, ordinary and partial differential equations, orthonormal sets of functions. Myers.

**Phys. 113 f, 114 s. Properties of Matter (3, 3)**—Three lectures. Prerequisite, Phys. 2 y, or Phys. 1 y and Math. 23 y.

A study of the constituent particles of matter and such properties of matter as gravitation, molecular attraction, elasticity, special properties of solids and of fluids at rest and in motion, wave propagation. Eichlin.

**Phys. 115 f, 116 s. High Frequency Phenomena (3, 3)**—Two lectures, one laboratory. Prerequisite, Phys. 2 y, or Phys. 1 y and Math. 23 y. (Not given in 1939-1940.)

A study of resonant circuits, characteristics of electron tubes, high frequency generators, filters, electromagnetic waves, propagation of waves in wires and through a conducting medium.

#### COURSES FOR GRADUATES

**Phys. 201 f. Atomic Structure (3)**—Three lectures.

A development of atomic theory by a discussion of the various atomic properties, particularly those of emission of spectra, scattering of X-rays and electrons, and valency. Myers.

**Phys. 202 f, 203 s. Spectra I and II. (3, 3)**—Three lectures.

I. Atomic Spectra. Interpretation of spectral series, fine and hyperfine structure, line intensities and polarization, line contours, and effects of external fields in light of modern atomic theory.

II. Molecular Spectra. A discussion of molecular spectra with particular reference to the information that is given about molecular structure, specific heats, entropy, and related phenomena. Myers.

**Phys. 204 f, 205 s. Quantum Mechanics (3, 3)**—Three lectures. (Not given in 1939-1940.)

A treatment of the general methods of quantum mechanics with applications to the theory of atomic and molecular structure, the theory of collision processes, and the theories of radiation and electro-dynamics.

**Phys. 206 s. Nuclear Structure (3)**—Three lectures.

The theory of the nucleus is developed by a discussion of masses, charges, magnetic moments, radioactivity, nuclear reactions, scattering, and interaction with radiation fields. Myers.

**Phys. 207 f, 208 s. Modern Physics (3, 3)**—Three lectures.

A comprehensive survey of developments in physics leading to recent concepts of atomic structure, theory of radiation, interaction of radiation and matter, quantum theory, relativistic mechanics, cosmology. Dickinson.

**Phys. 209 f, 210 s. Dynamics I and II (3, 3)**—Three lectures. (Not given in 1939-1940.)

I. A treatment of dynamical systems in generalized coordinates by the equations of Lagrange, of Hamilton, and of Hamilton-Jacobi, by the Hamiltonian Principle, and by the use of canonical transformations.

II. Derivation of the equations of motion of a fluid, a study of irrotational motion, vortex motion, motion of solids through liquids, waves through liquids, viscosity.

**Phys. 211 f. Electrodynamics (3)**—Three lectures.

The electric and magnetic fields; properties of dielectrics; properties of electric conductors; electromagnetic induction; electromagnetic radiation; dispersion theory; electro- and magneto-optics. Dickinson.

**Phys. 212 s. Physical Optics (3)**—Three lectures.

A mathematical study of the electromagnetic theory of light, with applications to interference, diffraction, dispersion and polarization. Dickinson.

**Phys. 213 f, 214 s. Theory of Elasticity (3, 3)**—Three lectures.

A comprehensive discussion of the development of theoretical concepts of elasticity with particular attention to torsion, stresses in beams, curved bars, thin plates, stresses produced by dynamical causes, propagation of waves in solid media. Eichlin.

**Phys. 215 f, 216 s. X-ray and Crystal Structure (3, 3)**—Three lectures. (Not given in 1939-1940.)

A discussion of the production and measurement of X-rays with the application of X-ray methods to the study of the physical properties of crystals.

**Phys. 217 y. Seminar (2).**

Presentation of reports and discussion of current developments in physics and of original investigations on special problems. Staff.

## POLITICAL SCIENCE

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Pol. Sci. 101 f. International Relations (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s, or consent of instructor.

The course deals with the major factors underlying international relations, the influence of geography, climate, nationalism and imperialism, and the development of international organizations. Steinmeyer.

**Pol. Sci. 102 s. International Law (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s.

A study of the principles governing international intercourse in time of peace and war, as illustrated in texts and cases. Steinmeyer.

**Pol. Sci. 104 s. Recent Far Eastern Politics (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s, or consent of instructor.

The background and interpretation of recent political events in the Far East and their influence on world politics. Steinmeyer.

**Pol. Sci. 105 f. Problems of World Politics (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s, or consent of instructor.

The course deals with governmental problems of an international character, such as causes of war, problems of neutrality, propaganda, etc. Students are required to report on readings from current literature. Steinmeyer.

**Pol. Sci. 111 f. Principles of Public Administration (3)**—Three lectures. Prerequisite, Pol. Sci. 4 f or s.

A functional study of public administration in the United States, with special emphasis upon organization and the relation of administration to the other branches of government. Howard.

**Pol. Sci. 112 s. Public Personnel Administration (3)**—Three lectures. Prerequisite, Pol. Sci. 111 f, or consent of instructor.

A study of public personnel practices in the various jurisdictions of the United States and their comparison with practices in certain European countries. Howard.

**Pol. Sci. 114 s. Municipal Government and Administration (3)**—Three lectures. Prerequisite, Pol. Sci. 4 f or s.

A detailed study of selected problems of municipal government, such as housing, health, zoning, fire and police, recreation, and planning. Course includes a visit to Baltimore to observe the agencies of city government at work. Kline.

**Pol. Sci. 117 f, 118 s. Government at Work (3, 3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s and consent of instructor.

This course consists of visits to various administrative agencies of the national government, supplemented by reading assignments on the work of the agencies visited. Howard.

**Pol. Sci. 121 f. Political Parties and Public Opinion (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f, or s.

A descriptive and critical examination of the party process in government: nominations and elections, party expenditures, political leadership, the management and conditioning of public opinion. Bone.

**Pol. Sci. 123 f. Government and Business (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s.

A general survey of governmental activities affecting business, with special emphasis upon recent developments; federal and state assistance to, and regulation of business in their historical and legal aspects; government ownership and operation. Bone.

**Pol. Sci. 124 s. Legislatures and Legislation (3)**—Three lectures. Prerequisite, Pol. Sci. 4 f or s.

A comprehensive study of the legislative process, bicameralism, the committee system and the lobby, with special emphasis upon the legislature of Maryland. The course includes a visit to Washington to observe Congress at work. Bone.

**Pol. Sci. 131 f. Constitutional Law (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s.

A systematic inquiry into the general principles of the American constitutional system as interpreted by the Supreme Court, with special reference to the role of the judiciary in the interpretation and enforcement of the Constitution, the position of the states in the federal system, state and federal powers over interstate and foreign commerce, and the rights of citizens and of accused persons. Kline.

**Pol. Sci. 134 s. Administrative Law (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s.

A study of the principles involved in the expansion of the discretion of administrative boards and commissions, including an analysis of their functions, their powers over private rights, their procedure in making findings, the enforcement of their rules and orders and judicial control of their actions. Kline.

**Pol. Sci. 136 s. Elements of Law (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s.

Development of law and legal systems; comparison of methods and procedure in making and enforcing law in Roman and common law systems; consideration of fundamental legal concepts; contribution and influence of modern schools of legal philosophy in relation to law and government. Walther.

**Pol. Sci. 141 f. History of Political Theory (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s, or consent of instructor.

A survey of the principal political theories set forth in the works of writers from Plato to Bentham. Walther.

**Pol. Sci. 142 s. Recent Political Theory (3)**—Three lectures. Prerequisite, Pol. Sci. 1 f or s, or consent of instructor.

A study of recent political ideas, with special emphasis upon theories of democracy, socialism, communism, fascism, etc. Walther.

#### COURSES FOR GRADUATES

**Pol. Sci. 201 f. Seminar in International Organization (2).**

A study of the forms and functions of various international organizations. Special attention is given to the work of the World Court. Steinmeyer.

**Pol. Sci. 202 s. British Empire (3).**

A study of the constitutional development of the British Dominions, with particular attention to the present inter-imperial relationship. Steinmeyer.



**Pol. Sci. 205 y. Seminar in American Imperialism (4).** (Not offered in 1939-1940.)

Individual reports on selected topics, with special reference to the causes and methods of recent American imperialistic policy. Steinmeyer.

**Pol. Sci. 211 y. Seminar in Federal-State Relations (4).**

Reports on topics assigned for individual research in the field of recent federal-state relations. Howard.

**Pol. Sci. 215 f. Problems of Government in Metropolitan Regions (2).**

Analysis of some metropolitan areas and some of the most pressing problems arising out of the existence of dense populations spread over a large number of small governmental units having similarly inadequate powers and facilities to cope with the problems involved; discussion of possible solutions. Kline.

**Pol. Sci. 221 f. Seminar in Public Opinion (2).** (Not offered in 1939-1940.)

Reports on topics assigned for individual research in the field of public opinion. Bone.

**Pol. Sci. 222 s. Psych. 280 s. Analysis of Propaganda (3)**—Two lectures and one discussion. Prerequisite, consent of instructors.

Analytical approach to modern propaganda, including study of organizations which employ propaganda, of techniques in actual use in disseminating propaganda, and of attempts at measuring the effects of propaganda. Responsibility for instruction is shared by the Department of Political Science and the Department of Psychology. Bone, Jenkins.

**Pol. Sci. 251 f. Bibliography of Political Science (1).**

This course is intended to acquaint the student with the literature of the various fields of political science and to instruct him in the use of government documents. Staff.

**Pol. Sci. 261. Research in Political Science (2-4).**

Credit according to work accomplished. Staff.

## POULTRY HUSBANDRY

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Poultry 101 s. Poultry Genetics (3)**—Three lectures, demonstration, quiz periods. Prerequisites, Poultry 2 f and Gen. 111 f.

The inheritance of morphological and physiological characters of poultry; inheritance of factors related to egg and meat production and quality.

**Poultry 102 f. Poultry Nutrition (2)**—One lecture, one two-hour laboratory, demonstration, quiz. Prerequisite, Poultry 1 f and 1 s.

The nutritive requirements of poultry; feed cost of poultry production.

**Poultry 104 y. Poultry Products (4)**—Two lectures, demonstration, quiz periods. Prerequisite, Poultry 1 f and s.

This course will include material on egg and meat quality, commercial grades, relation of transportation and distribution to quality, and methods of marketing, especially as related to quality.

**Poultry 106 f. Poultry Physiology (1 or 2)**—One lecture, one two-hour laboratory. Prerequisite, Poultry 102 s.

The physiology of development and incubation of the embryo, especially physiological pathology of the embryo in relation to hatchability. Physiology of growth and the influence of environmental factors on growth and development.

**Poultry 107 y. Poultry Industrial and Economic Problems (4)**—Two lectures.

This course will present the relation of poultry to agriculture as a whole, and its economic importance. Consumer prejudices and preferences, production, transportation, storage, and distribution problems; trends in the industry, surpluses and their utilization, poultry by-products and disease problems, will be presented.

**Poultry 109 f and s. Poultry Literature (2-8).**

Readings on individual topics, oral and written reports, methods of analysis and presentation of scientific material.

#### COURSES FOR GRADUATES

**Poultry 201 f. Advanced Poultry Genetics (3)**—Three lectures. Prerequisite, Poultry 102 s or equivalent.

This course will serve as a foundation for research in poultry genetics. Linkage, crossing-over, inheritance of sex, the expression of genes in development, inheritance of resistance to disease and the influence of the environment on the expression of genetic capacities will be considered.

**Poultry 202 f. Advanced Poultry Nutrition (3)**—Two lectures, one laboratory. Prerequisite, Poultry 102 f or equivalent.

Deficiency diseases of poultry; vitamin, mineral and protein deficiencies. Synthetic diets, metabolism and the physiology of digestion, growth curves and their significance, and feed efficiency in growth and egg production.

**Poultry 203 s. Physiology of Reproduction of Poultry (3)**—Two lectures, one two-hour laboratory.

The role of the endocrines in reproduction, especially with respect to egg production. Fertility, sexual maturity, broodiness, molting, egg formation, ovulation, deposition of egg envelopes and the physiology of oviposition.

**Poultry 204 y. Seminar (2).**

Reports of current researches by staff members, graduate students and guest speakers.

**Poultry 205. Research.**

Research with poultry may be conducted under the supervision of staff members toward the requirements for advanced degrees.

PSYCHOLOGY

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Psych. 110 f or s. Advanced Educational Psychology (3)**—Prerequisite, Psych. 10 f or s. (Not given in 1939-1940.)

Advanced treatment of the solution of basic psychological problems in education by methods of controlled observation.

**Psych. 120 f. Psychology of Individual Differences (3)**—Prerequisite, Psych. 1 f or s.

The occurrence, nature, and causes of psychological differences between individuals, methods of measuring these differences, and their importance in education, business and industry. Ghiselli.

**Psych. 121 s. Experimental Social Psychology (3)**—Prerequisite, Psych. 1 f or s.

Results of researches on behavior in social settings; experimental studies of the effects of group membership, of the family, and of current social forces. Jenkins.

**Psych. 125 f. Child Psychology (3)**—Prerequisite, Psych. 1 f or s.

Experimental analysis of child behavior; motor and intellectual development, emotions, social behavior, parent-child relationships, and problems of the growing personality. Clark.

**Psych. 130 f or s. Mental Hygiene (3)**—Two lectures and one clinic. Prerequisite, Psych. 1 f or s. Repeated in second term.

The more common deviations of personality; typical methods of adjustment. Sprowls, Hall.

**Psych. 131 s. Abnormal Psychology (3)**—Two lectures and one clinic. Prerequisite, Psych. 130 f or s.

The nature, occurrence, and causes of psychological abnormality with emphasis on the clinical rather than theoretical aspects. Sprowls, Hall.

**Psych. 140 f. Psychological Problems in Market Research (3)**—Prerequisite, Psych. 3 s or permission of instructor.

Use of methods of controlled observation in determining public reactions to merchandise, and in measuring the psychological influences at work in particular markets. Jenkins.

**Psych. 141 s. Psychology in Advertising and Selling. (3)**—Prerequisite, Psych. 3 s.

Experimental and statistical studies of psychological aspects of advertising; methods of measuring the effectiveness of advertising; the role of such factors as attention, memory, belief, etc.; problems associated with specific advertising media. Ghiselli.

**Psych. 150 s. Psychological Tests and Measurements (3)**—Two lectures and one laboratory period. Prerequisite, Psych. 120 f or permission of instructor.

Critical survey of psychological tests used in vocational orientation and in industry, with emphasis on methods by which such tests are validated; practice in the use of tests and the interpretation of test data. Bellows.

**Psych. 160 f. Psychological Aspects of Industrial Production (3)**—Prerequisite, Psych. 3 s or permission of instructor. (Not given in 1939-1940.)

Controlled observation applied to psychological problems in industrial production, including psychological effects of conditions and methods of work.

**Psych. 161 s. Psychology of Personnel (3)**—Prerequisite, Psych. 3 s or permission of instructor.

Psychological problems involved in the management of personnel in modern business and industry. A consideration of employee selection, measures of ability, methods of developing and maintaining personal efficiency and morale. Clark.

**Psych. 170 f. Legal Psychology (3)**—Prerequisite, Psych. 121 s or permission of instructor.

Interpretation of researches pertaining to accuracy of observation and of testimony, psychological aids in determination of guilt, and treatment of the offender. Sprowls.

**Psych. 190 y. Techniques of Investigation in Psychology (3)**—Three periods of practice and discussion. Prerequisite, Psych. 3 s.

A consideration of quantitative methods in psychology, the design of experiments, and actual practice in various methods of obtaining data and in treating these results for interpretation. Ghiselli.

**Psych. 195 f or s. Minor Problems of Psychotechnology (3).** Staff.

#### COURSES FOR GRADUATES

**Psych. 200. Research in Psychotechnology (4-6)**—Credit apportioned to work accomplished.

**Psych. 210 y. Seminar in Educational Psychology (6)**—An advanced course for teachers and prospective teachers.

Systematic approach to advanced problems in educational psychology based upon specific experimental contributions. Sprowls.

**Psych. 240 y. Seminar in Current Psychotechnological Problems (6)**—An advanced course for students pursuing major graduate studies.

A systematic analysis of recent contributions in selected psychotechnological fields. Jenkins.

**Psych. 250 y. Participation in Testing Clinic (4-6)**—Credit apportioned to work accomplished.

Actual practice in the administration of tests of aptitude, interest, and achievement and interpretation of test data in the course of routine operation of the testing bureau. Bellows.

**Psych. 255 s. Psychological Problems in Vocational Orientation (3)**—Prerequisite, Psych. 150 s or equivalent.

Experimental development and use of the vocational counseling interview, aptitude tests, and related techniques for the occupational orientation of youth. Bellows.

**Psych. 261 f. Advanced Personnel Psychology (3)**—Lectures and field periods. Prerequisite, Psych. 161 f.

Actual participation in industrial and governmental personnel programs, together with periodic discussions of the principles involved. Intended primarily for students planning to enter personnel administration. Clark.

**Psych. 280 s.—Pol. Sci. 222 s. Analysis of Propaganda (3)**—Two lectures and one discussion. Prerequisite, consent of instructors.

Analytical approach to modern propaganda, including study of organizations which employ propaganda, of techniques in actual use in dissemination of propaganda, and of attempts at measuring the effects of propaganda. Responsibility for instruction is shared by the Department of Political Science and the Department of Psychology. Bone, Jenkins.

## SOCIOLOGY

### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Soc. 101 f. Community Organization (2)**—Two lectures. Prerequisite, Soc. 1 f or s.

An analysis of the community and its component social groups; ecological foundations of the community; the structure and functions of special interest groups; the role of social institutions and agencies in community life; leadership and followership in group activities. Dodson.

**Soc. 102 f. Rural Sociology (2)**—Two lectures. Each graduate student will be required to prepare an extra term paper.

The structure and functions of rural communities, ancient and modern; the evolution of rural culture; rural institutions and their problems; the psychology of rural life; composition and characteristics of the rural population; relation of rural life to the major social processes; the social aspects of rural planning. Lister.

**Soc. 103 s. Urban Sociology (2)**—Two lectures. Each graduate student will be required to prepare an extra term paper.

The origin and growth of cities; composition and characteristics of city populations; the social ecology of the city; social relationships and groupings in the city; the organization of urban activities; social problems of the city; the planning and control of urban development. Joslyn.

**Soc. 104 f. Recent Social Thought (2)**—Two discussions. Prerequisites, Soc. 1 f or s, and consent of instructor. Intended mainly for sociology majors and minors.

A critical study of the leading schools of sociological thought since 1800.

Joslyn.

**Soc. 105 s. Population Problems (2)**—Two lectures. Prerequisite, Soc. 1 f or s. (Not offered in 1939-1940.)

Population growth in the United States; contemporary trends in fertility and mortality; differential fertility and mortality; changes in the composition of our population and their significance; population migration in modern times; qualitative problems of population; theories of population growth and decline. Jacobi.



**Soc. 106 f. Regional Sociology (2)**—Two lectures. Prerequisite, Soc. 1 f or s.

An analysis of American society and culture from the standpoint of regional similarities and differences. Topics to be covered will include: the meanings and implications of regionalism; criteria of regional differentiation; types of regions in the United States; problems peculiar to various regions; regional planning. Hodge.

**Soc. 107 f. The Village (2)**—Two lectures. Each graduate student will be required to prepare an extra term paper. (Not offered in 1939-1940.)

The evolution of the American village; present day social structure and functions of the village; an analysis of village population; the relationship of the village to urban and open-country areas; village planning.

**Soc. 108 s. The Family (2)**—Two lectures. Prerequisite, Soc. 1 f or s.

Anthropological and historical backgrounds; biological, economic, psychological, and sociological bases of the family; the role of the family in personality development; family and society; family disorganization; family adjustment and social change. Jacobi.

**Soc. 120 f. Social Pathology (2)**—Two lectures. Prerequisite, Soc. 1 f or s, or consent of instructor.

A study of maladjustments between the individual and his social environment which represent deviations from generally accepted norms. Problems to be covered will include: poverty, unemployment, family disorganization, crime and delinquency, suicide, and the misuse of leisure time. Joslyn.

**Soc. 121 f. Criminology and Penology (3)**—Three lectures. Prerequisite, Soc. 120 f.

The nature and extent and cost of crime; causative factors; historical methods of dealing with criminals; apprehension of alleged criminals; the machinery of justice; penal institutions; other means of caring for convicted persons; the prevention of crime. Jacobi.

**Soc. 122 s. Juvenile Delinquency (2)**—Two lectures. Prerequisite, Soc. 120 f.

The nature of delinquency; the relations between delinquency and crime; the delinquent child as a social problem; causative factors in delinquency; the juvenile court movement; disposition and treatment of delinquent cases as a form of social work; evaluation of contemporary programs of crime prevention. Jacobi.

**Soc. 123 f. The Sociology of Leisure (2)**—Two lectures. Prerequisite, Soc. 120 f.

This course deals with the sociological implications of leisure time and its uses, particularly in contemporary American life. The group aspects of recreation, including both commercialized and voluntary forms, community organization and planning for leisure-time activities, and related subjects are included. Wittler.

**Soc. 124 s. Introduction to Social Work (3)**—Three lectures. Prerequisite, Soc. 120 f.

The theory of social work; social case work, generic and specific; procedure and techniques in social case work; principles of social diagnosis; present day types of social work; administration of public and private welfare agencies. Field trips will be made to representative social agencies. Joslyn.

**Soc. 150 s. Field Practice in Social Work (2)**—Open only to sociology majors upon consent of instructor. Enrollment restricted to available opportunities.

Supervised field work of various types undertaken during the summer months and suited to the needs of the individual students. Joslyn.

#### COURSES FOR GRADUATES

**Soc. 201 y. Systematic Sociology (4)**—Two lectures.

A study of the fundamental theoretical problems of sociology. Reference will be made to the works of Comte, Spencer, Durkheim, Weber, and Pareto. Joslyn.

**Soc. 202 s. Comparative Sociology (2)**—Two lectures.

An intensive study of selected problems bearing on the significance of resemblances and differences shown in the social life and cultures of primitive as compared with civilized peoples. Wittler.

**Soc. 203 s. Community Organization (2)**—Two lectures.

Special problems in the field of rural, village, suburban, and urban community organization. Studies will be made of the composition, structure, and functioning of particular communities. Dodson.

**Soc. 204 f. Rural-Urban Sociology (2)**—Two lectures.

A study of the differences between rural and urban societies with reference to composition of population, social mobility, social relationships, differentiation of social groups, standards of living, mores and attitudes, and various pathological conditions. Lister.

**Soc. 205 s. Regional Sociology (2)**—Two lectures.

The meanings and implications of regionalism; demarcation of regions in the United States on the basis of geographic, economic, demographic, political, and cultural criteria; characteristics and problems peculiar to each region; planning for regional development. Hodge.

**Soc. 221 f. Criminology and Penology (2)**—Two lectures.

An intensive study of the major problems of criminology, including the history of criminological theory, factors involved in crime causation, administration of criminal justice, modern trends in dealing with criminals, and present theories of crime prevention. Jacobi.

**Soc. 250. Sociological Research (2-4)**—Credit according to work accomplished.

Individual research projects involving either field work or analysis of compiled data. Staff.

## STATISTICS

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Stat. 111 f. Biological Statistics (2)**—Two lectures.

Organized for students in biology. A study of expressions of type, variability, correlation, regression, error, and significance of differences.

**Stat. 112 s. Advanced Biological Statistics (2)**—Two lectures. Prerequisite, Stat. 111 f.

A study of error, multiple and partial correlation, predictive formulae, empirical curves, analysis of variance and covariance.

**Stat. 116 s. Statistical Design (2)**—Two lectures. Prerequisite, Stat. 15 s or 112 s.

A study of the principles of logical design for investigations when the resulting data are to be subjected to statistical analysis. Methods and uses of randomization, factorial design and confounding are considered in some detail.

**Stat. 117 f. Least Squares (2)**—Two lectures.

Development of the principles of least squares; problems in curve fitting; relation between minimum chi-square and maximum likelihood.

**Stat. 120. Problems (2-4).**

To acquire training and experience in independent statistical analysis, each student will select an approved problem for organization, analysis, and presentation of results.

## COURSES FOR GRADUATES

**Stat. 208. Special Problems (1-4).**

Each student registered in this course will choose a relatively complex problem for organization, analysis, and presentation of results.

## ZOOLOGY

## COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Zool. 101 f. Mammalian Anatomy (3)**—Three laboratories. Registration limited. Permission of the instructor must be obtained before registration.

A course in the dissection of the cat or other mammal. Recommended for premedical students, and those whose major is zoology. Hard.

**Zool. 102 s. Histological Technique (3)**—One lecture; two laboratories. Registration is limited and the permission of the instructor must be obtained before registration.

The preparation of animal tissues for microscopical examination. The course is designed to qualify the student in the preparation of tissues and blood for normal and pathological study. Hard.

**Zool. 103 f, 104 s. General Animal Physiology (3,3)**—Two lectures; one laboratory. Prerequisites, one year of chemistry and one course in vertebrate anat-

my. Registration limited to twelve, and permission of instructor must be obtained before registration.

The first semester work deals with the fundamentals of cellular and general physiology; the second semester is devoted to an application of these principles to the higher animals. Phillips.

**Zool. 105 f. Aquiculture (3)**—Two lectures; one laboratory. Prerequisite, one course in zoology.

The course deals with the practices employed in rearing aquatic animals and the properties of natural waters which render them suitable for environmental purposes. Truitt.

**Zool. 106 y. Journal Club (2)**—One session.

Reviews, reports, and discussions of current literature. Required of all students whose major is zoology. Staff.

**Zool. 108 f. Animal Geography (3)**—Two lectures; one laboratory. Prerequisite, one course in zoology.

This course deals with the distribution, classification, and environmental relations of animals. Several field trips are scheduled. Newcombe.

**Zool. 120 s. Animal Genetics (3)**—Two lectures; one laboratory.

The fundamental principles of heredity and variation. A consideration of the factors determining the formation and development of the characteristics of an individual and their manner of transmission through successive generations. Required of students whose major is zoology who do not have credit for Gen. 101 f. Burhoe.

**Zool. 121 s. Animal Ecology (3)**—Two lectures; one laboratory. Prerequisite, one course in zoology.

Animals are studied in relation to their natural surroundings. Certain environmental factors affecting growth, behavior and distribution are analyzed by observations and experiments conducted in the field and also in the laboratory under controlled conditions. Special field excursions are made to the mountains and sea shore. Newcombe.

#### COURSES FOR GRADUATES

**Zool. 200 s. Marine Zoology (4)**—Two lectures; two laboratories.

Problems in salt water animal life of the higher phyla. Truitt.

**Zool. 201 f. Microscopical Anatomy (4)**—Two lectures; two laboratories.

A detailed study of the morphology and activity of cells composing animal tissues. Recent advances in the field of cytology are covered in lectures, assigned readings and reports. Hard.

**Zool. 203 s. Advanced Embryology (4)**—Two lectures; two laboratories.

Mechanics of fertilization and growth. A review of the important contributions in the field of experimental embryology and development of animals, including a consideration of tissue culture and transplantation. Burhoe.

**Zool. 204 f. Advanced Animal Physiology (4)**—Two lectures; two laboratories.

The principles of general and cellular physiology as found in animal life.

Phillips.

**Zool. 205 f. Hydrobiology (4)**—Two lectures; two laboratories.

Biotic, physical, and chemical factors of the aquatic environment, including certain fundamental principles of oceanography. Special reference is made to the Chesapeake Bay region.

Newcombe.

**Zool. 206. Research**—Credit to be arranged.

Staff.

### CHESAPEAKE BIOLOGICAL LABORATORY

This laboratory, located in the center of the Chesapeake Bay country, is on Solomons Island, Maryland. It is sponsored cooperatively by the Maryland Conservation Department, Goucher College, Washington College, Johns Hopkins University, University of Maryland, Western Maryland College, and the Carnegie Institution of Washington, in order to afford a center for wildlife research and study where facts tending toward a fuller appreciation of nature may be gathered and disseminated. The program projects a comprehensive survey of the biota of the Chesapeake region.

The laboratory is open throughout the year. Courses are offered during a six-week summer session.

For further information about work at the Chesapeake Biological Laboratory, apply to Dr. R. V. Truitt, Director, College Park, Maryland.



# GRADUATE COURSES IN THE PROFESSIONAL SCHOOLS AT BALTIMORE

## SCHOOL OF MEDICINE

### ANATOMY

#### Minors

The courses recorded under "Minors" are acceptable as graduate courses only if they are taken to satisfy minor requirements in a major subject.

**Anat. 101 f. Human Gross Anatomy (10)**—Total number of hours 288. Five lectures; fifteen laboratory hours per week throughout the first semester.

A complete dissection of the human body (exclusive of the central nervous system). Uhlenhuth, Figge, Lipsett, Covington, Brantigen, Shelly.

**Anat. 102 f. Mammalian Histology (6)**—Two lectures; ten laboratory hours per week.

A general survey of the histological structure of the organs of mammals and man. Opportunity is offered for examining and studying a complete collection of microscopical sections. Davis, Lutz.

**Anat. 103 s. Human Neurology (4)**—Three lectures and six laboratory hours per week for ten weeks of the second semester. Prerequisite, Anat. 102 or equivalent.

This course provides a general survey of the structure of the human central nervous system, being mainly directed toward the fiber tracts and nuclei contained therein. It includes a brief study of the special senses. The laboratory work is based on a dissection of the human brain, together with the study of prepared microscopic sections of the brain stem. Davis, Lutz, Harne.

#### Majors

**Anat. 202.** For work leading to a Ph. D. in Anatomy.

A study of the neurological or embryological problems based on 102 f or 103 s. Only students who have had the preceding course in histology or neurology are eligible for this work. Davis.

Courses 203, 204 and 205 are offered throughout the year, including the summer time. Time and credit are adjusted in personal conference between student and instructor.

**Anat. 203. Advanced Gross Anatomy.** Total number of hours, approximately 150. Monday, Tuesday, Wednesday, 2-5 p. m.

The study of human anatomy by gross anatomical methods, especially by dissection of specialized structures and limited regions of the human body. The exact nature of this course will depend on the requirements of the applicant. It may be taken by students of anatomy, medicine and biology as well as by physicians desiring graduate work. Uhlenhuth, Figge, Lipsett, Brantigen.

**Anat. 204. Experimental Anatomy of the Endocrine Glands.**

This course is intended to impart broad familiarity with the subject and to provide, through the medium of laboratory work, a knowledge of the methods of its investigation. Intimate contact with the instructor, frequent informal discussions and properly selected reading take the place of formal lectures.

Uhlenhuth.

**Anat. 205. Problems in the Experimental Anatomy of the Endocrines.**

This course is a continuation of the previous one, but on an advanced level. It may be used for the preparation of a Doctor's thesis leading to a Ph. D. degree.

Uhlenhuth.

**BACTERIOLOGY****Minors**

**Bact. 101 f. General Bacteriology (5).** Sixteen lectures and 104 laboratory hours.

The course includes the preparation and sterilization of culture media and the study of pathogenic bacteria and the more important protozoa. The principles of general bacteriology are discussed in lectures.

**Bact. 102 s. Immunology (4)**—Sixteen lectures and 56 laboratory hours.

Principles of immunology are discussed in the lectures. Experiments to demonstrate the action of various antibodies are performed by the students.

**Majors**

**Bact. 201. Special Problems.** Time and credit are subject to special arrangement. A laboratory course on selected problems of bacteriology. The lectures are supplemented by personal contact with the instructor, discussions of the various phases of the work and by reading.

**Bact. 202. Research.** Time and credit are subject to special arrangement.

**BIOCHEMISTRY****Minors**

**Biochem. 101 s. Fundamental Principles of Biochemistry (6)**—Six lectures and conferences, and two three-hour laboratory periods per week for sixteen weeks, from February to May, inclusive.

This course is designed to present the fundamental principles of biological chemistry and to indicate their applications to the clinical aspects of medicine. The phenomena of living matter and its chief ingredients, secretions and excretions, are discussed in lectures and conferences and examined experimentally. Training is given in routine biochemical methods of investigation. This course is a prerequisite to advanced work in this subject. Graduate students who take this course as a minor toward a higher degree are required to supplement it by extra-curricular work.

Wylie, Schmidt, Ogden.

**Majors**

**Biochem. 201 f and s.** A course in specialized fields of biochemistry designed to prepare the student for advanced research work. Prerequisite, Biochem. 101 s.

The particular phases of biochemistry taken up in this course will vary with the requirements and interests of the student. The course is limited to students working toward a Ph. D. degree in biochemistry and in other biological subjects. Credit is allotted in keeping with the extent and quality of work accomplished. Wylie, Schmidt.

**Biochem. 202 f and s. Research.** Limited to graduate students seeking a Ph. D. degree in biochemistry. Credit is given on the basis of extent and quality of accomplishment. Wylie, Schmidt.

## PHARMACOLOGY

All students majoring in pharmacology with a view to obtaining the degree of Master of Science or Doctor of Philosophy should secure special training in anatomy, mammalian physiology, organic chemistry, and physical chemistry (Chem. 102 A y).

### Minors

**Pharmacology 101 f and s. General Pharmacology (7)**—Three lectures; one laboratory. This course consists of 75 lectures and 30 laboratory periods of three hours each; offered each year, September to May inclusive, at the Medical School.

Pharmacology as applied to medicine and the fundamental principles of pharmacologic technique are taught in this course, hence it is a prerequisite for all other advanced courses in this subject.

Krantz, Carr, Evans, Musser, Harne, Johnson.

### Majors

**Pharmacology 202 f. Chemotherapy.** Credit in accordance with the amount of work accomplished.

The action of new synthetic compounds from a pharmacodynamic point of view. Krantz.

**Pharmacology 203 f. Carbohydrate Metabolism.** Credit in accordance with the amount of work accomplished.

A systematic study of the relationship between chemical constitution and the fate of carbohydrates and carbohydrate-like substances in the animal body. Krantz, Carr.

**Pharmacology 204 f. Research.** Credit in accordance with the amount of work accomplished.

Properly guided research problems in pharmacology and related fields. Open to students majoring in pharmacology. Krantz, Carr.

**Pharmacology 205 f. Research.** Credit in accordance with the amount of work accomplished.

Special problems in toxicology, the detections of poisons in viscera and industrial poisons. Evans.

## PHYSIOLOGY

## Minors

**Physiology 101. The Principles of Physiology (8)**—Four lectures, two conferences, and two laboratory periods a week, supplemented by demonstrations. September to January, inclusive.

The fundamental concepts of physiology are presented in lectures and illustrated by laboratory experiments. Attention is given especially to those phases of physiology which are essential for a medical training. Amberson and Staff.

## Majors

**Physiology 201. Experimental Mammalian Physiology.** Time and credit by arrangement.

Open to properly qualified graduate students. The work will consist of selected experiments and discussions involving the original literature.

Amberson, Smith, Oster.

**Physiology 202. Physiological Effects of Radiation (1).** Weekly lectures and conferences during November and December. Open only to students with an adequate training in physics. A thesis will be required.

The purpose is to review the general principles and problems concerned in the use of radiation in medicine. Oster.

**Physiology 203. Physiology of the Endocrines (1).** Weekly lectures, October to January, inclusive, on recent developments in endocrinology. A thesis will be required. Smith.

**Physiology 204. Seminar.** Credit according to work done.

Intensive study of the literature in selected fields of physiology as a preparation for research. Amberson and Staff.

**Physiology 205. Research.** By arrangement with the head of the department. Staff.

## SCHOOL OF PHARMACY

### BOTANY

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Bot. 101 y. Taxonomy of the Higher Plants (4)**—One lecture; one laboratory.

A study of the kinds of seed plants and ferns, their classification, and field work on local flora. Emphasis will be placed on official drug plants. Instruction will be given in the preparation of an herbarium. Slama.

**Bot. 102 y. Advanced Vegetable Histology (8)**—Two lectures; two laboratories.

Work covers advanced plant anatomy, embedding of material in cellodine and in paraffin, section cutting, etc., leading to research. Slama.

#### COURSES FOR GRADUATES

**Bot. 201 y. Advanced Study of Vegetable Powders (4 to 8)**—Two lectures; two laboratories.

A study of powdered vegetable drugs and spices from the structural and micro-chemical standpoints, including practice in identification and detection. Slama.

**Bot. 202 y. Advanced Pharmacognosy. (4-8)**—Two lectures; two laboratories.

A study of many crude drugs not ordinarily studied in other pharmacognosy courses. Special attention will be given to practical problems and to the identification and detection of adulterants. Slama.

**Bot. 203. Research in Pharmacognosy.** Credit according to amount and quality of work performed.

### PHARMACEUTICAL CHEMISTRY

#### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Phar. Chem. 101 f. Chemistry of Medicinal Products (3-5).**—Two lectures; one to three laboratory periods.

A study of the more important medicinal plant products and of synthetic compounds. The laboratory work will include the isolation and identification of plant principles and the preparation of the simpler organic compounds used in medicine. Hartung.

**Phar. Chem. 101 s. Food Chemistry (4)**—Two lectures; two laboratory periods.

A study of the composition of foods, their adulterants, and the methods employed by public health and industrial laboratories for the analytical examination of foods. Hartung.



**Phar. Chem. 103 y. Physiological Chemistry (8)**—Two lectures, two laboratories. Prerequisites, Chem. 1 y, 2 y, 4 s, Physiol. 1 s.

General survey of the subject, including study of digestion, metabolism, excretion, enzymes, hormones, vitamins, and other topics of pharmaceutical interest. Chapman, Gittinger, McNamara.

**Phar. Chem. 105 y. Advanced Pharmaceutical Analysis (3-6)**—Three laboratory periods. The course may be elected for either or both semesters, and may be taken by undergraduates with the consent of the professor in charge.

A laboratory study of the qualitative and quantitative analytical procedures and methods as applied to official and commercial, natural and synthetic drugs, their intermediates and derivatives. Hartung.

#### COURSES FOR GRADUATES

**Phar. Chem. 200 y. Survey of Pharmaceutical Chemistry.** Credit and hours to be arranged. (Not given in 1939-1940.)

A survey of the chemical structure and reaction of selected groups of pharmaceutically and pharmacologically important compounds of non-basic nature. Hartung, Starkey.

**Phar. Chem. 201 y. Chemistry of Alkaloids (4)**—Two lectures.

A survey of the chemical structure and the reactions of pharmaceutically and pharmacologically important organic bases. Hartung.

**Phar. Chem. 202 y. Advanced Pharmaceutical Synthesis (1-8)**—Laboratory work and conferences.

A study of fundamental and basic chemical procedures employed in the synthesis of various drugs and their intermediates, and a survey of their application. Hartung.

**Phar. Chem. 203 y. Pharmaceutical Chemistry Seminar (2).**

Reports of progress and discussion of the problems encountered in research and the presentation of papers which survey the recent developments of pharmaceutical chemistry reported in the current literature. Required of all students majoring in the department throughout their period of matriculation. Hartung.

**Phar. Chem. 205. Research in Pharmaceutical Chemistry.** Credit to be determined by the amount and the quality of the work performed. Hartung.

#### PHARMACOLOGY AND THERAPEUTICS

##### COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Pharmacology 101 f. Official Methods of Biological Assay (4)**—Two lectures, two laboratories. Prerequisite, Physiology 1 f and Pharmacology 1 y.

A course in the methods of biological assay prescribed by the United States Pharmacopoeia and the National Formulary. Chapman.

COURSES FOR GRADUATES

**Pharmacology 201 y. Methods of Biological Assay (8)**—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f. (Given in alternate years.)

The application of statistical methods to the problems of biological assay and a study of the more important unofficial methods for the assay of therapeutic substances. Chapman.

**Pharmacology 202 y. Special Studies in Pharmacodynamics (2-4)**—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f.

The procedures involved in pharmacological analysis and in the determination of the site of action and the nature of action of drugs. Chapman.

**Pharmacology 203 y. Special Studies in Biological Assay Methods (4-8)**—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f, Pharmacology 201 y. (Given in alternate years.)

The development of biological assay methods and comparative standards for substances for which there are no satisfactory methods or standards.

Chapman.

**Pharmacology 204. Research in Pharmacology and Therapeutics.** Credit according to amount and quality of work performed. Chapman.

PHARMACY

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

**Pharmacy 101 y. (6)**—One lecture; two laboratories. Prerequisite, consent of the instructor.

A continuation of the courses given in the Pharmacy School in the second and third years with special reference to methods employed in the manufacture of pharmaceuticals on a commercial scale. DuMez.

COURSES FOR GRADUATES

**Pharmacy 201 y. Advanced Pharmaceutical Technology (8)**—Two lectures; two laboratories.

A study of pharmaceutical manufacturing processes from the standpoint of plants, crude materials used, their collection, preservation, and transformation into forms suitable for therapeutic use. DuMez.

**Pharmacy 202 y. Survey of Pharmaceutical Literature.** Credit according to the work performed.

Lectures and topics on the literature pertaining to pharmacy with special reference to the origin and development of the works on drug standards; pharmaceutical periodicals. DuMez.

**Pharmacy 203 y. History of Pharmacy (4)**—Two lectures.

Lectures and topics on the development of pharmacy in America and in the principal countries of Europe. DuMez.

**Pharmacy 204. Research in Pharmacy.** Credit and hours to be arranged. DuMez.

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